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A treatise on diseases of the anus, rect



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Shadworth O. Beasley M.D.



Dr. S.O. Beasley

A TREATISE ON
DISEASES OF THE ANUS
RECTUM, AND PELVIC COLON

BY

JAMES P. TUTTLE, A. M., M. D.

PROFESSOR OF RECTAL SURGERY IN THE NEW YORK POLYCLINIC MEDICAL SCHOOL
AND HOSPITAL, VISITING SURGEON TO THE ALMSHOUSE
AND WORKHOUSE HOSPITALS

*WITH EIGHT COLORED PLATES AND
THREE HUNDRED AND THIRTY-EIGHT ILLUSTRATIONS
IN THE TEXT*

SECOND EDITION, REVISED

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PREFACE TO SECOND EDITION

THREE imprints of this work having been exhausted, it is deemed advisable by the publishers to issue a second edition. Since its publication no radical changes have taken place in my opinions or practice of rectal surgery such as would call for a complete revision, but advantage is taken of this opportunity to correct whatever errors have been found in the book.

The sections on Anæsthesia in Rectal Diseases and Dysenteric Proctitis have been entirely rewritten; and numerous practical points gained from experience have been introduced into the text throughout the work. While I have endeavored to keep the book abreast with the times, its general plan and scope remain unaltered. To the profession who have so generously accepted the work, and to the critics who have been so kind to its shortcomings and flattering in its praise, I hereby extend my sincere thanks.

JAMES P. TUTTLE.

P R E F A C E

WITHIN the past decade the field of rectal surgery has been greatly broadened and its methods changed through improved instruments, aseptic technique, and a wider knowledge of pathology. The lively interest taken by the profession in this branch of medicine and the little attention paid to it in the undergraduate schools have resulted in the establishment of special clinics for teaching and treating rectal diseases.

This book is practically the outcome of twelve years' conduct of one of the first and largest clinics of this kind. The opinions expressed herein are therefore based upon a clinical experience derived from a large number of actual cases. Such an experience teaches that no one method succeeds always, and that the practitioner should be conversant with many in order that he may have resources in reserve for all emergencies. Therefore, while relating my own practices and opinions, I have also given those of other operators, so that the reader may have as complete a knowledge of the subject as possible.

Much space has been devoted to examination, diagnosis, and local treatment, because these are the subjects which the general practitioner needs most to know. The non-operative treatment of each disease is first described, together with the class of cases in which it will probably be useful; but when such measures are likely to prove futile I have not hesitated to say so.

The book has been written during an active practice, and almost every opinion expressed therein has been put to the test. I am sensible of its imperfections, but should it prove useful to the many physicians who have honored me by attendance upon my clinics or assist in the dissemination of knowledge upon these important subjects, I shall be amply repaid for the nights of labor it has cost.

I take this opportunity to express my appreciation of the generous assistance afforded me in the work by Drs. S. T. Armstrong, George H. Wellbrock, F. M. Jeffries, Mr. R. J. Hopkins, and the publishers, who have been patient, kind, and courteous. To them and all the friends who have aided me by suggestions and encouragement I extend my sincere thanks.

JAMES P. TUTTLE.

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DISEASES OF THE ANUS, RECTUM, AND PELVIC COLON

CHAPTER I

EMBRYOLOGY, ANATOMY, AND PHYSIOLOGY

For the purposes of our discussion the following anatomical divisions will be observed:

The *anus* is that portion of the intestinal tract which extends from the margin of the true skin to the free borders of the semilunar valves of Morgagni.

The *rectum* is that portion of the intestinal tract which extends from the free borders of the semilunar valves to a point about opposite the third sacral vertebra, where the gut becomes entirely surrounded by peritonæum and the lower end of the mesentery is attached.

The *pelvic colon* or *sigmoid flexure* is that portion of the intestinal tract which extends from the third sacral vertebra to the lower end of the descending colon at the external border of the left psoas muscle.

This division differs from that ordinarily given in works on anatomy and text-books on diseases of the rectum, but it gives definite limits to all three portions, and confines the term rectum to the immobile portion of the canal comprised between the points where the mesentery ceases above and the mucous membrane ceases below.

Embryology.—The sigmoid and rectum, like the upper portion of the alimentary canal, are developed from the hypoblast and mesoblast of the ovum; the anus is developed from the epiblast. In the development of the embryo, after the formation of the neural canal and the folding in of the three layers of the blastoderm, which forms the head and produces a cavity known as the "foregut," there appears a protrusion at the posterior blind end of the enteric groove, creating the so-called "hindgut," or rudimentary *rectum*.

Soon after the formation of the neural canal, the mesoblast is divided by cleavage into two layers, one of which follows the hypoblast

and the other the epiblast, and the space between them gradually enlarges to form the cœlum or pleuro-peritoneal cavity.

From the hypoblast the mucous membrane, and probably the sub-mucous tissue develop, while the inner layer of the mesoblast forms the muscular, peritoneal, and glandular portions of the gut (Schäffer).

To the sixth week of gestation the large and small intestines are one cavity, and of nearly an uniform caliber, with the exception of the

lower portion of the hindgut, which even at this early period is more capacious than any other portion of the intestinal tract except the stomach. About the sixth week the vermiform appendix is developed; from this time the colon, sigmoid, and rectum grow more rapidly in circumference than the "foregut," or small intestine, and, extending downward, more and more nearly approach the outer layer of the mesoblast and the epiblast at the lower portion of the embryo (Fig. 1).

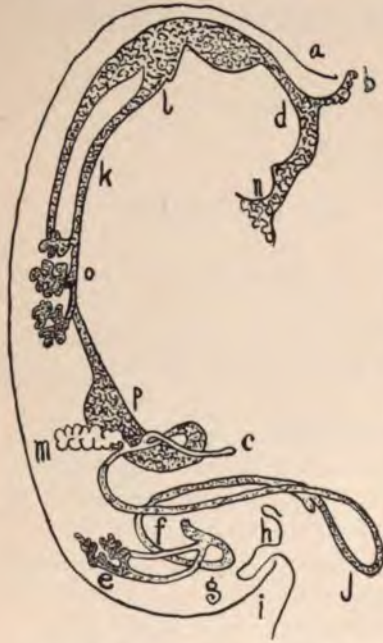


FIG. 1.—DEVELOPMENT OF INTESTINAL TRACT (Schäffer).

a, notochord; *b*, hypophysis; *c*, bile-duct; *d*, tongue; *e*, permanent kidney; *f*, cloaca; *g*, anus; *h*, sexual prominence; *i*, tail; *j*, caecum coli; *k*, trachea; *l*, larynx; *m*, pancreas; *n*, section of mandibular arch; *o*, commencing lung; *p*, stomach.

The blind end of the hindgut, in close apposition with the lower end of the spinal column and originally connected with the neurenteric canal, forms what has been called the cloaca, in that it receives at this period through the allantois the secretions of the urinary and genital organs as well as those of the intestinal canal.

About the eighth week of gestation the cloaca is divided, how we do not clearly understand, into two

parts; the anterior forms the uro-genital organs and the posterior the enteron or rudimentary rectum. Imperfection in this division causes many of the abnormalities of the rectum.

The urinary and generative organs develop from the inner layer of the mesoblast, some of the cells from which differentiate into a cord in which a lumen is formed, the so-called Wolffian duct, which has its posterior opening in the cloaca or hindgut, and thus connects the two systems. In normal development this duct closes, and the connection

between the urinary and alimentary tracts becomes obliterated about the twelfth week of gestation. It will be noted later that this communication sometimes persists and forms one of the types of malformations of the rectum. With such intimate relationship in development, one is not surprised to find these organs closely related in symptomatology and disease.

During the development of the rectum from the hypoblast and mesoblast there is going on an invagination of the epiblast or ectoderm, which is called the proctodæum (Fig. 2). This invagination increases until the outer and inner layers of the mesoblast are pressed together and absorbed, and the epiblast of the proctodæum and the hypoblast of the hindgut approach each other, and form a double septum between the rectum and the proctodæum or embryonic anus. Testut and Waldeyer state that the layers of the mesoblast are not present at this point; that the hindgut or enteron and proctodæum are separated by two epithelial layers, the one belonging to the hypoblast, the other to the epiblast. The existence of fibrous tissue in this septum, in cases in which the latter has not been absorbed, would indicate that the absence of the mesoblast at this point is not at all uniform. The absorption of the septum renders the conjunction of the rectum and anus complete, and leaves a narrow zone that indicates the transition from mucous to muco-cutaneous tissue, which has been termed by Stroud the "pecten" (Fig. 3). This zone marks the lower limits of the rectum and the upper margin of the anus.

The conjunction takes place generally at a point slightly in front of the posterior end of the gut, and thus leaves a *cul-de-sac* which, as has been said, is connected with the neurenteric canal. This *cul-de-sac* and connecting canal are largely absorbed during foetal life, leaving



FIG. 2.—DEVELOPMENT OF RECTUM
(Schäffer).

a, section of mandibular arch; b, hypophysis, behind it the remains of the pharyngeal septum; c, commencing lung; d, stomach; e, liver; f, yolk stalk; g, Wolffian duct; h, blind portion of hindgut.

the coccygeal gland or gland of Luschka, which is situated just in front of the coccyx and remains in adult life. Sometimes imperfect absorption leaves a congenital posterior rectocele. It is from the remains of this posterior *cul-de-sac* and communicating canal that dermoid cysts and other teratoid tumors of the recto-coccygeal space develop.

It will be seen from this brief and incomplete account of histogenesis that the rectum proper is a development of the hypoblast and mesoblast in common with the rest of the colon; that its muscles and



FIG. 3.—DIVISIONS OF ANAL CANAL (Stroud).

a, skin; b, Hilton's white line; c, pecten; d, anal papilla; e, anal pocket; f, frilled mucosa; g, linea dentata; h, rectal glands.

submucous layer are from the inner layer of the mesoblast, and that it logically and practically ends with the serrated margin of the pecten or free borders of the semilunar valves. It is also apparent that the anus, with all its surrounding muscles, cells, and fasciæ, is a development of the epiblast and outer layer of the mesoblast, and histologically includes all that portion of the intestinal tract below the upper margin of the pecten.

As will be seen farther on, the membranes, the glands, the blood and nerve supply all undergo a more or less abrupt change at this point, and the diseases which we encounter in the two portions are almost as distinct. It is necessary, therefore, to understand exactly the limitations of the anus, rectum, and sigmoid, and also to describe them separately.

They are discussed consecutively from below upward, because this is the order in which they are met in examination and treatment.

The bony outlet of the pelvis comprises a somewhat diamond-shape space, which an imaginary line extending from the anterior border of one tuberosity of the ischium to the other divides into two triangular spaces. The anterior one is known as the uro-genital triangle, and the posterior as the rectal triangle (Fig. 4). For convenience of description these triangles are further divided by a line drawn from the symphysis pubis to the tip of the coccyx into the right and left anterior and posterior quadrants.

The uro-genital triangle is in close relation with the anus and rectum, and contains important genito-urinary organs. The rectal triangle contains the anus, rectum, and surrounding tissues. The anatomy of the parts included in these two spaces must be thoroughly understood in order to practise rectal surgery successfully.

The Perinæum.—The perinæum is the space comprised in the urogenital triangle. It is bounded by the anus behind, the scrotum in front, and the rami of the ischii upon the sides, and is occupied by various important structures. Superficially it is covered by the skin, in the central line of which there runs a rhaphe continuous with the central rhaphe of the scrotum, and ending at the margin of the anus. There is nothing peculiar in this cutaneous layer, except that in the central rhaphe there are few glandular constituents and very few hair follicles. Immediately beneath the skin is found the su-

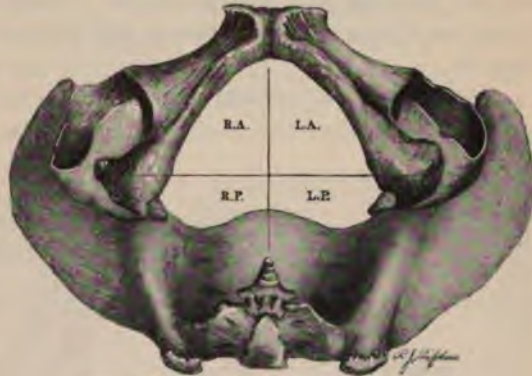


FIG. 4.—DIVISIONS OF THE PELVIC OUTLET.

R.A., right anterior quadrant; *L.A.*, left anterior quadrant; *R.P.*, right posterior quadrant; *L.P.*, left posterior quadrant; *R.A.* and *L.A.*, uro-genital triangle; *R.P.* and *L.P.*, rectal triangle.

perificial fascia of the perinæum, which is continuous with the superficial fascia all over the body. It is not attached to the bones or muscles, but coalesces with the deep fascia, at the orifices; beneath this is found the superficial perineal fascia, called also Colles's fascia, which is continuous with the dartos of the scrotum in front, attached on each side to the rami of the pubes and ischii, and stretched across the posterior border of the perineal space in a line slightly anterior to the tuber ischii. In front of the anus this fascia dips down around the posterior border of the transversus perinæi muscles, to be attached to the free border of the triangular ligament (deep perineal fascia). The latter structure is a dense, fibrous membrane stretched across the anterior portion of the pelvic floor. It is divided by anatomists into superficial and deep layers. Anteriorly it arises from the superior pubic ligament, is attached laterally to the rami of the pubes and ischii a little deeper than the crus penis. Posteriorly it is stretched across the perineal space, just above the transversus perinæi muscles, and is continuous with the posterior border of the superficial fascia; while its attachment anteriorly is above that of the superficial fascia, their posterior borders are conjoined, and the two thus enclose a wedge-shaped space anterior to the anus. In this space are situated the accelerator urinæ, transversus perinæi, and the erector penis muscles, the corpus spongiosum, the perineal arteries and nerves, and the bulbous urethra containing Cowper's glands. This

wedge-shaped space is divided into two triangular spaces by the attachment of the two walls in the center to the raphe of the perineal body and the accelerator urinæ muscle (Fig. 5). These spaces communicate anteriorly through a tract of cellular tissue at the junction of the scrotum and the perinæum. They are filled with cellular tissue, in which the blood-vessels and nerves of the generative organs ramify.

The transversus perinæi muscle crosses the posterior border of the perinæum from one tuberosity of the ischium to the other; the accel-

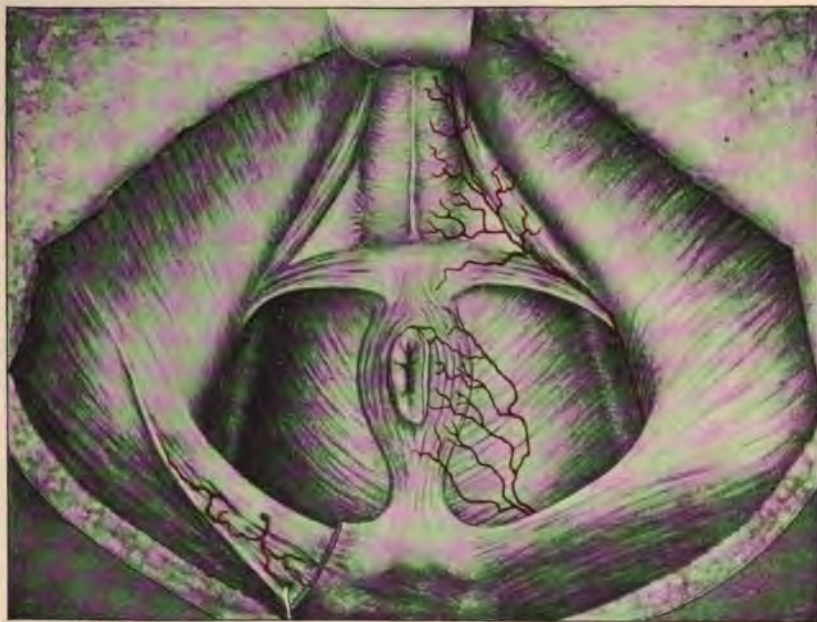


FIG. 5.—DISSECTION SHOWING MUSCULAR ARRANGEMENT AT PELVIC OUTLET, PERINEAL TRIANGULAR SPACES, AND ISCHIO-RECTAL FOSSÆ.

erator urinæ muscle runs through the center of the space, being covered by the superficial fascia, and these, together with the external sphincter and the sphincter vaginæ in women, unite in a common fibrous center called the perineal body, just in front of the anus. The deep and superficial fasciæ thus enclose important organs connected with the urogenital tract, and form a barrier between them and the rectum.

Ischio-rectal Fossæ.—Back of these perineal spaces, and separated from them by the wedge-shaped border of the perineal fasciæ and the transversus perinæi muscles, are situated the ischio-rectal spaces which practically surround the lateral and posterior portions of the anus and rectum. They measure from before backward 5 to 8 centimeters (2 to 3½

inches), from side to side $2\frac{1}{2}$ to $3\frac{1}{2}$ centimeters (1 to $1\frac{3}{8}$ inch), and in depth from 4 to 10 centimeters ($1\frac{9}{16}$ to $3\frac{1}{8}$ inches), according to the size of the subject (Fig. 5).

Each fossa forms an irregular, wedge-shaped or cuneiform space, its base being directed downward. Each space is enclosed by the perineal fascias and the transversus perinæi muscle in front, the levator ani muscle above, the obturator fasciæ, the obturator internis muscle, the ischium and the sacro-ischiatic ligaments externally, the rectum and the anus internally, the gluteus maximus muscle, the sacro-sciatic ligaments and the coccyx posteriorly, and the skin and superficial fascia below. The fossæ are connected posteriorly by a zone of cellular tissue between the fibers of the levator ani muscle and the ano-coccygeal ligament. These spaces are filled by fat and cellular tissue, in which ramify the blood-vessels and nerves of the lower end of the rectum and the perineal branch of the fourth sacral nerve. The fat in these spaces is supported by a network of connective-tissue bands which divides them into numerous compartments that communicate with each other through the lymphatics and the blood-vessels. It is owing to these divisions that one often finds in operating upon abscesses here that he has to deal with multiple cavities instead of one large excavation. The deepest portion of the spaces lies close to the rectum. This explains the fact that in large abscesses in this region the highest point is always nearest the rectal wall. Although these fossæ are crossed by numerous blood-vessels and nerves, none of them is vitally important surgically, for the entire cellular tissue may be destroyed without any serious damage to the nerve or blood supply of the adjacent organs.

Above the levator ani muscle are situated the superior pelvi-rectal and retro-rectal spaces, but these can be better understood after the anus and rectum have been described.

The Anus or Anal Canal.—The anus is usually described as a simple orifice at the lower end of the intestinal tract, but practically it embraces all that portion of the tract below the true mucous membrane. It is situated in the middle of the pelvic outlet just back of the imaginary line drawn between the tuberosities. In women it is slightly farther forward than in men, the distance from the coccyx measuring in the former 25 to 30 millimeters (1 to $1\frac{3}{16}$ inches), and in the latter 20 to 25 millimeters ($\frac{3}{4}$ to 1 inch). In a condition of repose it appears as an antero-posterior slit (Fig. 6). The skin around it is slightly pigmented and drawn into folds by the contraction of the sphincter muscle. Embedded in this skin, chiefly posteriorly, are sudoriparous glands called circumanal glands, some sebaceous glands, and a few hair follicles, from which issues a short stumpy growth of hair. All of these decrease as

the central portion of the anus is approached, and disappear altogether where the skin changes into muco-cutaneous tissue.

Behind the anus there is a smooth, dense ridge of skin extending to the posterior surface of the coccyx, called the anal rhapshe; in front

of it is the perineal rhapshe proper, which has been already described. As the center of the anus is approached the skin loses its corneous character, gradually changing into muco-cutaneous tissue, which is finally transformed into mucous membrane at the upper end of the anal canal.

Dimensions.—The anal canal is limited by the true skin below and the free borders of the semilunar valves or the ano-rectal line of Testut (*Traité d'anatomie humaine*, vol. iv, p. 234). It measures from 16 to 24 millimeters ($\frac{2}{3}$ to 1 inch) in length. Its circumference varies from

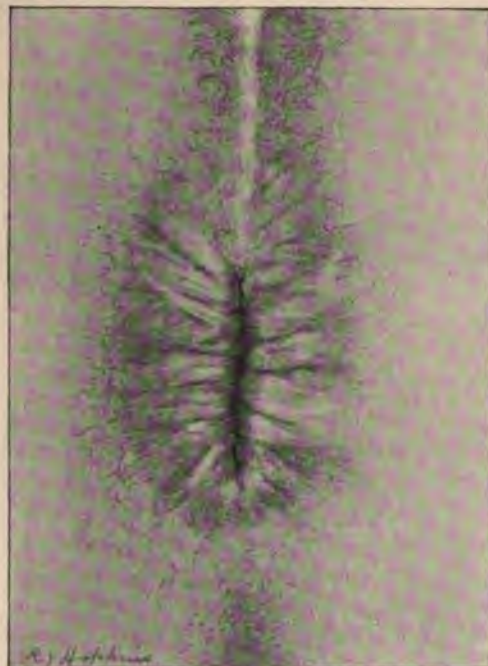


FIG. 6.—NORMAL ANUS IN REPOSE.

3 centimeters ($1\frac{3}{8}$ inch) in normal condition to 15 centimeters ($5\frac{5}{8}$ inches) in disease, following injury or vicious practices. The average anus will admit a cylinder of 65 millimeters in circumference without rupturing the mucous membrane.

The walls of the anal canal are composed of muco-cutaneous, fibro-cellular, and muscular layers. The muco-cutaneous layer is smooth, shiny, and glossy. It contains few glands and blood-vessels, but it is richly endowed with terminal nerve-ends. It is covered in its lower portion by stratified, squamous epithelium, which undergoes a gradual transformation until it ends in the typical columnar epithelium of the mucous membrane at the upper margin of the linea dentata or ano-rectal line. This irregular border limits the upper end of the anus, and forms the central floor of the rectal ampulla. The dentations are slightly elevated above the surface of the adjoining mucosa, and form an irregular ridge between the rectum proper and the anal canal. They

vary in number from five to eight, and assume the form of papillæ at their summits. Andrews (*Diseases of the Rectum*, 1895, p. 303) considers these papillæ the normal tactile organs of the rectum endowed with a special rectal sense. Stroud, however, states that they are abnormal structures growing from the tips or faces of the indentations. He found in them epidermal, dermal, and amyelinic nerve-fibers. They are absent, or at least not noticeable in the large majority of cases; but when they are well developed they produce many reflex disturbances which are accounted for by their abundant nerve supply (Fig. 7).

In the upper portion of the muco-cutaneous tissue one finds a few irregular, tubular glands analogous to those seen in the rectum. Stroud calls them accidental glands, but Hermann considers them as simple mucous crypts. About 4 to 5 millimeters ($\frac{3}{16}$ of an inch) below the ano-rectal line there is a poorly defined line or depression which marks the lower end of the internal sphincter, and is known as Hilton's white line. In many cases this is almost imperceptible to the eye, but it can always be made out by touch, as it marks the juncture between the internal and external sphincter muscles.

The Fibro-cellular Layer.—Beneath the

muco-cutaneous tissue, and separating it from the muscular layer, is a thin fibro-cellular layer of the anal canal. Above Hilton's white line this layer is chiefly cellular, below this point it develops into a thin layer of connective tissue continuous with the superficial fascia covering the ischio-rectal fossæ. It is closely attached to the muco-cutaneous and muscular layers, thus uniting the two and preventing any great movement of one upon the other.

The Muscular Layer.—The anal canal is surrounded by the external sphincter, some fibers of the levator ani, the longitudinal muscular fibers of the rectum, and a few of the circular fibers comprising the lower portion of the internal sphincter. The external sphincter forms the chief muscular wall of the anal canal. A few interlacing fibers of the levator ani and the longitudinal muscles of the rectal wall pass down between

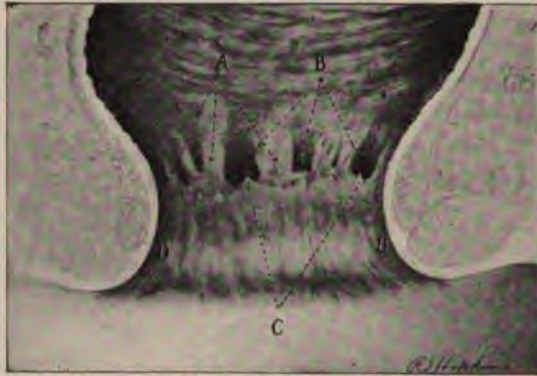


FIG. 7.—THE ANAL CANAL.

A, columns of Morgagni; B, semilunar valves or crypts of Morgagni; C, dentate border marking upper limits of anus and surmounted by papillæ; D, Hilton's white line.

THE ANUS, RECTUM, AND PELVIC COLON

fibers and around its lower margin to be attached to the deeper layer of the skin, and thus comprise a portion of the muscular wall. The arrangement of these fibers will be seen in the illustration (Fig. 8).

The External Sphincter Muscle.—The external sphincter is composed of voluntary or striated muscular fibers, and from a surgical point of view is the most important muscle of the rectum. It arises from the

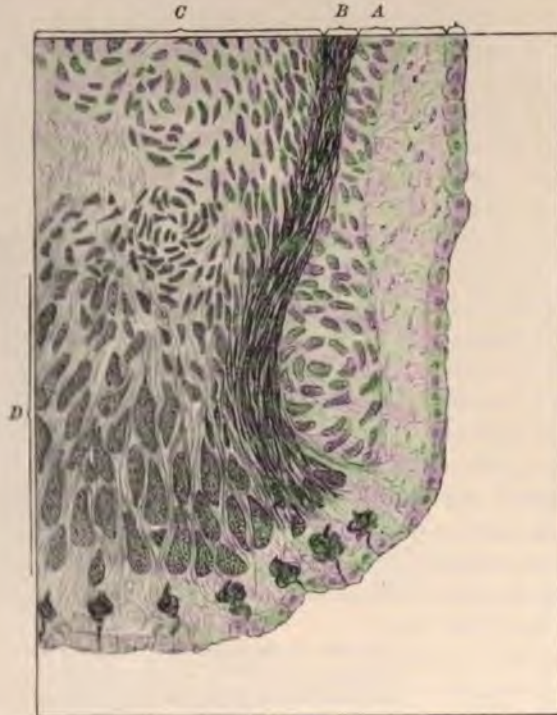


FIG. 8.—LONGITUDINAL SECTION OF ANAL WALLS, SHOWING ARRANGEMENT OF MUSCULAR FIBERS.

circular muscular fibers of intestine ending in internal sphincter below; *B*, longitudinal muscular fibers of gut penetrating external sphincter; *C*, fibers of levator ani, some cut transversely in upper portion, and others longitudinally where they are united to gut wall and proceed downward. *D*, external sphincter.

terior surface of the coccyx and the fibrous layer of the skin over this region, passes forward to the posterior commissure of the anus, where its parallel fibers divide to surround this aperture, and reuniting at the anterior commissure, pass forward to be inserted into the perineal body. It is composed of a superficial and deep layer. The fibers of the superficial layer are circular and entirely surround the anus (Fig.

The fibers of the deep layer are parallel, and simply separate and enclose themselves to the anal portion of the rectum to the height of 1 to

2 centimeters ($\frac{3}{8}$ to $\frac{1}{2}$ of an inch). In women it is continuous in front with the fibers of the sphincter vaginae (Fig. 9). Inside of the external sphincter the fibers of the levator ani, the longitudinal muscles, and the internal sphincter, which form a part of the walls of the anal canal, are found.

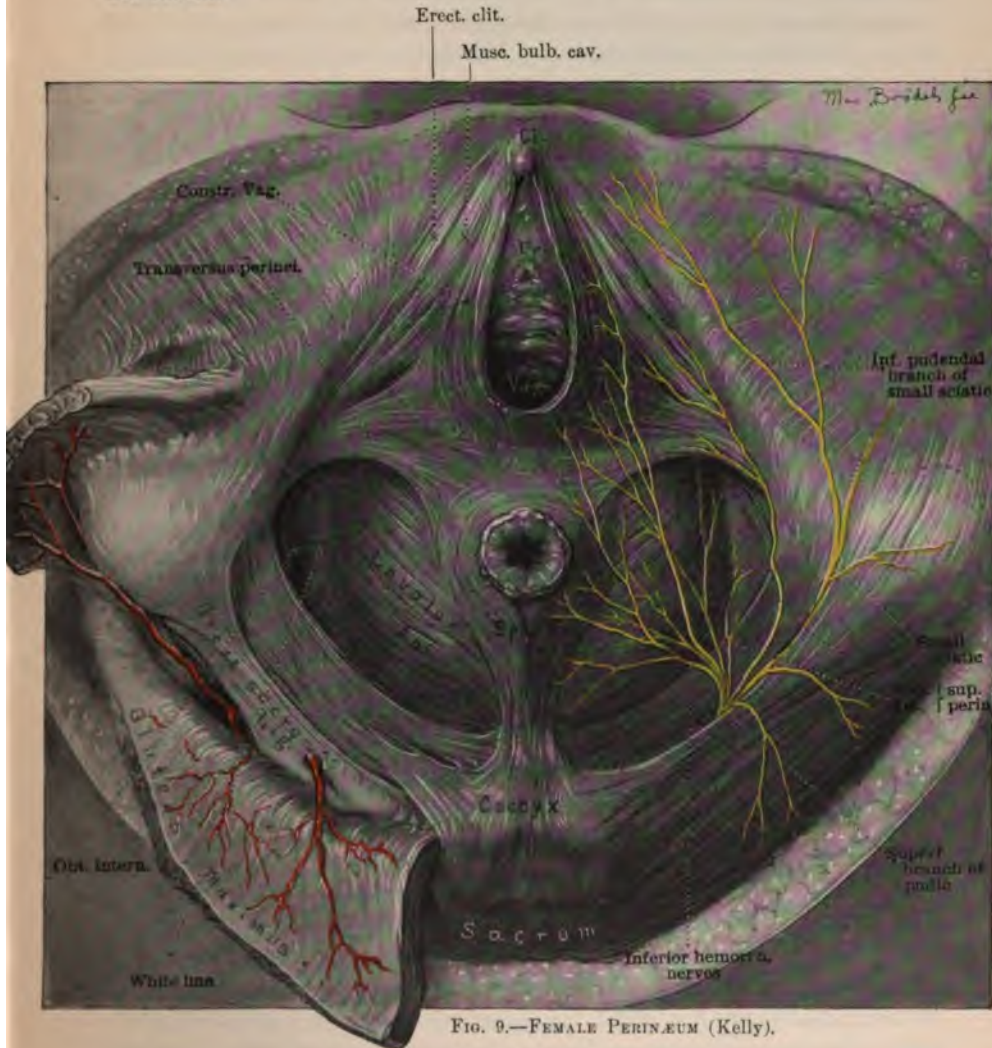


FIG. 9.—FEMALE PERINÆUM (Kelly).

Levator Ani Muscle.—The levator ani is a broad sheet of muscular fibers which forms the supporting floor of the pelvic cavity (Fig. 10). It arises in front upon each side of the symphysis pubis, laterally from the pelvic fascia along the line of its attachment with the obturator fascia, and posteriorly from the spine of the ischium on each side of the pelvis.

Its anterior fibers pass downward and backward around the prostate gland to unite with the fibers of the opposite side beneath the neck of the bladder; the middle fibers pass downward and inward around the rectum, some being attached to the sides of this organ, and interlacing at their lower ends with the fibers of the external sphincter, while others unite posteriorly and pass backward to be inserted on the anterior surface of the coccyx. The posterior fibers pass downward and backward, and are inserted upon the sides of the coccyx and lower part of the sacrum.



FIG. 10.—LEVATOR ANI MUSCLE.
Drawn from dissection by the author.

Cripps (*Diseases of the Rectum*, p. 9) states that this muscle crosses the rectum at right angles, and thus encloses this organ in the narrow angle of a V-shaped muscular formation, in consequence of which its only action is to constrict the rectum (Fig. 11). Upon this anatomical construction he has based his ingenious theory of spasmodic stricture. Numerous dissections have failed to show any other arrangements than illustrated in Fig. 10. Viewed from below, the muscle appears as an inverted dome, and the contraction of its fibers not only lifts but also constricts the rectum and anus. Its fibers are not uniformly spread out, but are collected in small bundles, the spaces between these being occupied by fibrous tissue.

Ischio-coccygeus Muscle.—Anatomists describe the posterior fibers of the levator ani as a distinct muscle under the above name. The portion so described arises from the rami and spine of the ischium and from the border of the sacro-ischiatic ligament, and passes downward, inward, and backward, to be inserted by aponeurotic fibers upon the sides of the coccyx and last sacral vertebra. This portion of the muscle is somewhat more fibrous than the anterior portion; its function seems to be that of pulling the coccyx forward. It forms the floor of the pelvis posterior to the rectum.

The author sees no reason for describing it as a separate muscle, and therefore when reference is made to the levator ani in this book the entire muscular plane or floor of the pelvis will be meant.

Recto-coccygeus Muscle.—Under this name, and also under the names tensor fasciæ pelvis (Kohlrausch) and retractores recti (Treitz), two flat bands of unstriped muscular fibers have been described, which are said to arise from the coccygeal ligament near the tip of the coccyx, and pass forward and downward, finally blending with the longitudinal muscular fibers of the rectum and the pelvic fascia around the anus.

Relations of the Anal Canal.—According to the foregoing descriptions, the relations of the anal canal are as follows: Anteriorly it is in relation with the perineal body, the deep layer of the superficial perineal fascia, the posterior border of the triangular ligament, and the anterior fibers of the levator ani muscle; laterally with the perianal fasciæ, which separate it from the ischio-rectal fossæ, and with the external sphincter muscle; posteriorly it is in relation with the external sphincter, the levator ani, and the ano-coccygeal ligament.



FIG. 11.—LEVATOR ANI MUSCLE (Cripps).

A, anus; B, bladder; C, coccyx; R, rectum; S, symphysis pubis; LA, levator ani muscle.

The blood-vessels, nerves, and lymphatics of the anus are so intimately connected with those of the rectum proper that it is deemed advisable to describe them all together.

THE RECTUM

The rectum, as defined, comprises that portion of the intestinal canal between the semilunar valves of Morgagni and the attachment of the mesentery opposite the third sacral vertebra. Treves first advocated this division. It gives to the organ definite limits; it separates the mobile from the immobile portion of the gut; it marks the line where the course of the blood supply changes; it indicates the point where the three longitudinal muscular bands of the colon spread out and become more or less equably distributed around the gut; and, finally, it marks a point at which there is always a decided narrowing in caliber, indicating the juncture of the rectum with the pelvic colon.

According to this division, that portion of the rectum which is ordinarily called the superior or first portion is included in the sigmoid flexure under the term pelvic colon, and justly so, as it corresponds in every anatomical detail with the other loops of this organ.

Course and Direction.—The name rectum would imply that the organ is straight, but such is not the case. Beginning in the hollow of the sacrum, it follows the sacro-coccygeal curve downward, being first directed backward, then forward, and finally backward again at the anal canal. It thus forms a double antero-posterior curve, the concavity of which is directed forward in the superior portion and backward in the lower or prostatic portion. It begins ordinarily opposite the center of the sacrum, passes outward to the right beyond the central line, and then again to the left, thus making two lateral curves as it descends. These curvatures are not marked, and they are of no great practical importance. The antero-posterior curvatures are well marked, however, and indicate the direction in which the finger or instruments should be directed in introducing them into the organ. They are more marked in some individuals than in others, and may be greatly increased by tumors, displaced uteri, or pelvic adhesions.

Above the third sacral vertebra the sigmoid begins: the canal may turn to either the right or left; the angle may be sharp or obtuse, and there is no way of accurately determining this except by ocular inspection.

Divisions.—The rectum may be divided into two portions—the inferior or prostatic portion, and the superior or sacro-coccygeal portion. The inferior portion is very short, and extends from the ano-rectal line

or upper border of the crypts of Morgagni to the summit of the prostate. The superior portion extends from the summit of the prostate to the middle of the third sacral vertebra.

Some writers subdivide the upper portion of the rectum into peritoneal and infraperitoneal portions. This division, however, is impractical, inasmuch as it is impossible to determine the lower limits of the peritoneal covering. Numerous divisions and subdivisions are confusing, and the author prefers to study the organ as a whole.

Dimensions.—The length of the rectum is 10 to 15 centimeters ($3\frac{1}{2}$ to $5\frac{1}{2}$ inches) in men, and 9 to 13 centimeters ($3\frac{1}{2}$ to $5\frac{1}{2}$ inches) in women. This varies according to the size of the individual, and is somewhat greater in old people than in young. These measurements are less than those ordinarily given, on account of the fact that they do not include the first or superior portion of the rectum in the old divisions.

The diameter is very difficult to obtain in the living subject. It measures when empty 10 to 20 millimeters from before backward, and 30 to 40 millimeters from side to side. When distended, or removed from the body and spread open, its measurements vary greatly, and sometimes assume enormous proportions. Sappey has reported a case in which the gut measured 34 centimeters ($13\frac{3}{8}$ inches) in circumference at its widest point. From the chapter on Foreign Bodies in the Rectum one will gain some idea of the extent to which the organ may be dilated.

The circumference varies in the different portions of the organ, being on an average 6 to 10 centimeters in the prostatic portion, 12 to 20 centimeters in the widest portion of the ampulla, and 10 to 14 centimeters in its upper or narrow portion. Numerous instances have been recorded in which these figures were greatly exceeded. Quénu and Hartmann, after having excised and split open a large number of recti, give the following average circumference: Anus, 5 to 9 centimeters; rectal ampulla, 13 to 16 centimeters below and 8 to 10 centimeters above; the tubular portion, or the last loop of the sigmoid according to our division, 10 to 12 centimeters.

Conformation.—When the rectum is empty, the anterior walls are pressed backward by the pelvic contents, and thus come in close apposition with the posterior walls. Thus there is formed a lateral slit or flattened canal, much wider from side to side than from before backward. When distended with gas, liquids, or solid substances, the organ assumes an irregular cylindrical shape. It is often wider from side to side than from before backward on account of pressure by the pelvic organs, or through adhesive bands which prevent its being distended as much in the antero-posterior direction as in the lateral. The irregular shape of the organ will be appreciated by referring to several



FIG. 12.—CAST OF RECTUM (Quénu and Hartmann).



FIG. 13.—CAST OF RECTUM (Quénu and Hartmann).

illustrations (Figs. 12 to 17) of casts made by filling the organ with plaster of Paris, paraffin, and other such substances.

In certain cases of atony, or where the rectum has been greatly distended, it assumes a very irregular shape, the sacculi resolving them-



FIG. 14.—CAST OF RECTUM AND ANAL CANAL. Showing irregular curves in former. (Quénu and Hartmann.)



FIG. 15.—CAST OF RECTUM AND LOWER LOOP OF SIGMOID (Martin).

selves into true diverticuli. In other cases, especially where there has been a protracted rectitis, the organ assumes a cylindrical or tubular shape, with slight variation in caliber from the apex of the prostate upward. This condition is the normal one in children, and is said by



FIG. 16.—CAST OF RECTUM.
Showing sudden contraction in caliber at junction with sigmoid. (Quénu and Hartmann.)



FIG. 17.—CAST OF RECTUM AND ANAL
CANAL (Quénu and Hartmann).

Gally to occur once in every six adults. This proportion, however, appears to the author to be largely overestimated.

The external surface is irregularly convoluted, but less so than the sigmoid flexure. The grooves which mark its contour correspond with the site of the mucous folds or Houston's valves internally.

Anatomical Structure.—The walls of the rectum are composed of four layers or coats. From within outward they comprise the mucous, the submucous, the muscular, and the serous layers.

The Mucous Membrane.—The mucous membrane of the rectum differs from that of the upper colon in that it is thicker, darker in color, more vascular, and more mobile, being attached to the muscular wall through a loose, lax, submucous tissue, which allows it to slide in all directions. It is characterized by a great development of tubular and muciparous glands, together with many closed follicles and an extensive vascular apparatus. Throughout its extent it is thrown into loose horizontal folds, some of which correspond with the valves of Houston. In its lower portion it is gathered into longitudinal folds, constituting the columns of Morgagni, between the bases of which are

found the semilunar valves or crypts of Morgagni, the free borders of which mark the limitation of the rectum above and the anus below.

Structure of the Mucous Membrane.—The membrane is composed of three layers: the epithelial, glandular, and muscular. The *epithelial layer* consists of a layer of columnar cells throughout the rectum proper. This changes, however, into stratified polyhedral and prismatic layers in the transitional zone at the lower end of the organ. Below the epithelium there are numerous closed follicles; between these follicles are the glands of Lieberkühn, which practically compose the substance of the mucous membrane.

The glands in the rectum, chiefly Lieberkühn's follicles, differ somewhat from those in the upper portion of the colon in containing more goblet or mucus-secreting cells. The glands are tubular and are very close together, the intervening tissue measuring about one-sixth the diameter of the tubes.

The cells lining the tubules are arranged at right angles to the cavity, and are continuous with those covering the mucous membrane between the tubules. The arrangement of these tubules is similar to that of a honeycomb, the division between any two forming a common wall for each of them.

The intertubular tissues are composed of a fine trabecular network, the long meshes of which run parallel to the tubules, forming, according to Cripps and Testut, lymph-paths. Practically, the Lieberkühn follicles are nothing more than inverted villi. They are said to be inverted on account of the solid condition of the material with which they come in contact, but their function remains the same as that of the villi—viz., the absorption of the fluid contents of the bowel. The absorption takes place through the epithelium or through the intervening spaces, more probably through the former.

At the lower end of the rectum are found numerous compound racemose glands, called by Schäffer anal glands. Here and there between the Lieberkühn glands are found small nodules of lymphoid tissue, which are said to possess a very feeble vitality. These have no mouths or openings connecting them with the cavity of the rectum, and no connection with the lymphatics, so far as has been discovered.

The *muscular layer* of the mucous membrane, called the *muscularis mucosa*, is somewhat more developed in the rectum than in the other portions of the colon. Kohlrausch (*Anat. u. Physiol. der Beckenorgane*, Leipzig, 1854) described these fibers under the name of *sustentator tunicae mucosæ*. Treitz states that the fibers are specially developed in the columns of Morgagni, but other anatomists have failed to establish this fact. The exact functions of these minute fibers are not known.

Submucous Layer.—The submucous tissue of the rectum consists in a loose, alveolar network of elastic tissue and connective-tissue cells. It is thicker and more elastic than at any other portion of the intestinal canal, and thus allows a greater mobility of the mucous membrane above it. In this tissue ramify the blood-vessels, nerves, and lymphatics. In certain diseases it becomes greatly hypertrophied, and may become entirely transformed into fibrous tissue.

Muscular Wall.—The muscular coat of the rectum is composed of circular and longitudinal fibers. The circular fibers compose the inter-



FIG. 18.—ARRANGEMENT OF CIRCULAR MUSCULAR FIBERS OF RECTUM.



FIG. 19.—DIAGRAMMATIC ILLUSTRATION OF CHIEF AGGREGATIONS OF CIRCULAR MUSCULAR FIBERS IN RECTAL WALL.

nal layer. This layer is irregular in its distribution, the fibers being aggregated at different levels upon one part of the circumference and spread out at the other (Figs. 18, 19). The chief aggregation of fibers is at the lower end, where they go to make up the internal sphincter. The muscular fibers throughout the rectum are separated by connective-tissue fibers arranged parallel to them. This arrangement apparently accounts for the rapid development of the connective-tissue strictures in inflamed conditions.

Internal Sphincter.—This muscle, composed of an aggregation of circular fibers, begins about 4 centimeters above the anal margin, and gradually increases in thickness until it reaches the ano-rectal line, after

which it thins out again and disappears about the middle of the anal canal (Fig. 8). Its width from above downward averages 1 to 3 centimeters ($\frac{1}{2}$ to $1\frac{1}{2}$ inch). Its thickness is so variable that no accurate measurement can be given. Its lower fibers are below and within the grasp of the external sphincter, from which it is separated by a narrow zone of connective tissue (Fig. 8).

A depressed zone, not always perceptible to the eye but appreciable by digital touch, marks the line of division between these two muscles. The internal sphincter is purely an involuntary muscle, but it is looked upon by many surgeons as the most important factor in fecal continence, and in the production of constipation.

The Third Sphincter.—Aggregations of circular fibers at different levels of the rectum have been the cause of much controversy. Velpeau (*Traité d'anat. chir.*, 1837, p. 39) says: "Nélaton described a muscle which he called the superior sphincter, and which is situated about 4 inches above the anus, about the spot where strictures of the rectum are generally observed. It is formed of fibers which are both aggregated and fan-shaped. Its depth in front is about six to seven lines, while posterior and on the sides it is spread out to about 1 inch." Velpeau, while denying some of the functions attributed to the muscle, confirmed Nélaton's description, and Gosselin (*Arch. gén. de méd.*, 1854, p. 668) described this aggregation as dividing the upper and middle portions of the rectum.

Hyrŕl (*Topog. Anat.*, p. 162) described this aggregation. He frankly confessed that his dissections failed to confirm its uniform presence, but, reasoning from physiological phenomena, claimed that there was a true circular sphincter entirely surrounding the rectum at this point. His claims have not been verified by Sappey (*Traité d'anatomie humaine*, p. 272). Chadwick (*Transactions of the American Gynecological Society*, vol. ii, 1877), Lamier and Testut (*op. cit.*, vol. iv, p. 211) have all practically verified Nélaton's statement. There are also similar aggregations above and below this point (Fig. 20). It is generally conceded that these aggregations of circular fibers occur at the base of Houston's valves, and that the muscular fibers extend into the layers of these valves. O'Beirne (*New Views of the Process of Defecation*, Dublin, 1833) described the aggregation found at the juncture of the sigmoid and rectum as the third sphincter, and attributed to it a most important rôle in the act of defecation. Dissection has demonstrated the existence of an aggregation of circular fibers on the concave surface of the gut at this point, the fibers of which spread out upon the sides and convexity (Fig. 19). It is claimed that the action of such a muscle will constrict the gut at the point where the fibers are concentrated, and this muscular constriction can be easily demonstrated through the modern proctoscope.

From the casts made of the rectum and microscopic examination of the intestinal walls, it has been shown that there exist at every flexure of the rectum and colon an aggregation of circular fibers proportionate to the acuteness of the flexure; that in the rectum these aggregations are situated opposite the insertion of the valves of Houston, and, finally, the chief aggregations occur about 3 inches above the margin of the anus and at the junction of the rectum and sigmoid. Assuming that a perfect ring of aggregated circular fibers is necessary to the formation of a sphincter, it must be admitted that there is no anatomical conformation above the internal sphincter to which this term can be applied. On the other hand, if we consider the semicircular aggregations as sphincters, one must admit not only a third but a fourth, fifth, and even more sphincters. Such a nomenclature would be confusing, and therefore these aggregations should be called the semicircular muscles of the rectum, and the term third sphincter should be discarded.

Longitudinal Muscular Layer.—Outside of the circular fibers is the longitudinal muscular layer of the rectum. This layer is a continuation of the three longitudinal muscular bands of the colon which coalesce at the juncture of the rectum and sigmoid, and spread out, forming a distinct coat around the rectum, somewhat thicker in front and behind than upon the sides. This layer is divided by anatomists into external, middle, and internal portions.

The external fibers pass downward and are inserted into the superior pelvic fascia covering the upper surface of the levator ani muscle. The middle fibers mingle with those of the levator ani, and are attached with them to the rectal wall. The internal fibers pass downward, together with some fibers from the levator ani between the two sphincters, and are inserted in the superficial fascia surrounding the anus. Goodsall and Miles state that these fibers can be seen to pass between the deep and superficial layers of the external sphincter muscle. The arrangement of these fibers in the upper portion of the rectum is very irregular,



FIG. 20.—DISSECTION BY MARTIN.
Showing fan-shaped arrangement of circular muscular fibers.

as will be seen from the illustration (Fig. 21) taken from Lamier. Sometimes they dip into the flexures of the gut, and at others they pass over the same.

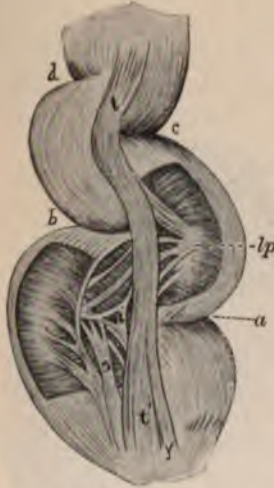


FIG. 21.
ARRANGEMENT OF LONGITUDINAL MUSCULAR LAYER OF THE RECTUM (Lamier).

a, b, c, d, grooves of rectal cylinder; *t, t'*, longitudinal fibers forming woven bundle; *s*, longitudinal band arising in part from circular fibers; *lp*, fan-shaped bands arising from both muscular layers; *y*, fasciculus splitting off from longitudinal bundle, *t, t'*.

Outside of the longitudinal muscular layer in the lower portion of the rectum the walls are reenforced by the fibers of the levator ani muscle.

Serous Coat.—Beginning at the lower point of the pelvic peritoneal *cul-de-sac*, the peritonæum covers the anterior surface of the rectum, and, passing upward and backward in an oblique line, finally invests the entire circumference of the organ at about the level of the third sacral vertebra. As this coat passes upward it is reflected externally upon the sides of the pelvis, thus forming the lateral supports of the rectum (Fig. 22). At the level of the third sacral vertebra the two folds of peritonæum unite posteriorly to form the pelvic mesocolon or mesorectum. Anteriorly the serous coat is reflected upon the bladder in males and the uterus in females, thus forming the recto-vesical or Douglas's *cul-de-sac*. These *culs-de-sac* contain the sigmoid flexure, loops of small intestine, and sometimes the cæcum, vermiform appendix, and the ovaries. The depth to which they extend upon the anterior surface of the rectum varies in individuals and under different

circumstances. With the bladder and rectum empty, they extend to within 6 centimeters of the margin of the anus; but when these organs are distended this distance may be increased to 9 or even 12 centimeters ($4\frac{3}{4}$ inches). They are about 1 to 2 centimeters nearer the anal margin in women than in men. In cases of procidentia with rectal hernia, or where the perinæum has been injured during childbirth, the *culs-de-sac* sometimes approach very near the perineal surface. In one case the *cul-de-sac* was separated from the perinæum by only the thickness of the external sphincter muscle. These variations are rendered important by the fact that the *culs-de-sac*, when extending abnormally low, may be easily penetrated in operations upon the anterior wall of the rectum.

Columns of Morgagni, Pillars of Glisson, Columns of the Rectum.

—The mucous membrane at the lower end of the rectum is gathered

together into longitudinal folds designated by the above names. They are rendered more prominent by the contraction of the sphincter, and obliterated by dilatation of the canal. The base of each column joins with the dentate margin, forming the upper limit of the anus, and is continuous at its outer angle with the adjacent semilunar valve. The top of the column gradually spreads and loses itself in the smooth mu-

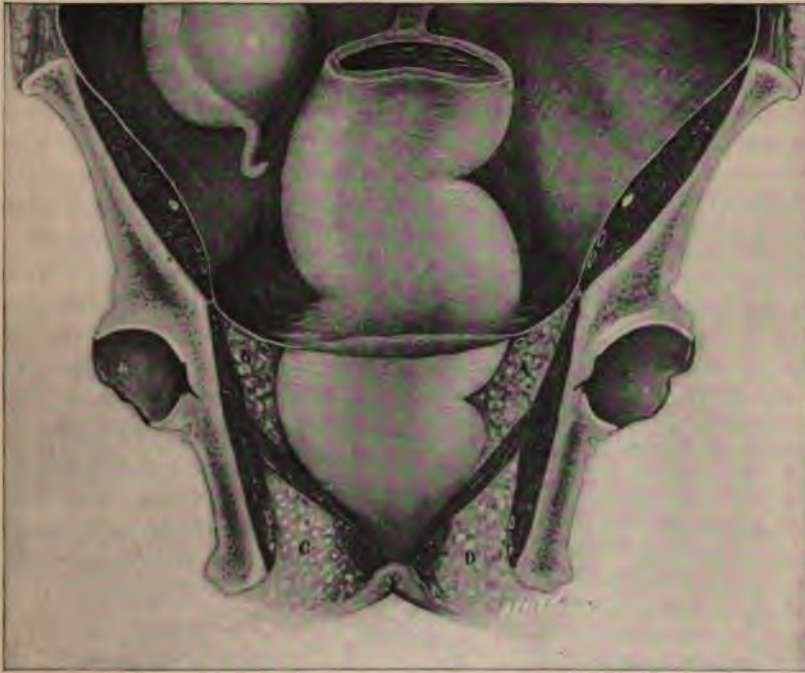


FIG. 22.—SHOWING REFLECTION OF PERITONÆUM FROM RECTUM ON TO THE PELVIC WALLS.
A, B, superior pelvi-rectal spaces: C, D, ischio-rectal fossae.

cous membrane of the rectal wall. They vary in number from five to twelve, and measure from base to apex 10 to 12 millimeters (about $\frac{1}{2}$ an inch) (Fig. 7). They are composed of mucous and submucous tissue, and contain, according to Treitz, some muscular fibers which act in overcoming the eversion which takes place at the time of defecation.

The grooves between these columns gradually deepen from above downward, and end in the semilunar valves. Testut (*op. cit.*, vol. iv, p. 224) states that in these grooves are found irregular elevations caused by dilatation of the subjacent veins.

Semilunar Valves, Crypts of Morgagni, Anal Pockets.—The rectal mucous membrane ends below in an irregular festooned border composed of small folds stretched across from the base of one rectal column

to another, their concavity being directed upward. The upper border of these folds comprises the so-called ano-rectal line. Behind these folds the membrane dips down and forms little pouches of variable depths, which are called the crypts of Morgagni or anal pockets. The folds themselves are termed the semilunar valves of the rectum. The epithelium covering these folds gradually changes from the stratified polyhedral form to the typical columnar epithelium of the rectal mucous membrane. The free borders of the valves are concave, and their extremities are continuous with the angles of the rectal columns. They vary in number from five to twelve, as do the rectal columns, and measure in width from 6 to 12 millimeters. In depth they measure upon an average 3 to 5 millimeters. In some cases there is scarcely any depression, while in others a veritable sinus exists behind the valves (Fig. 7, B). They are said to be deeper and more apparent in early life than in old age, but they are often quite marked in adults. They are almost invariably absent at the anterior and posterior commissures of the rectum, but there is generally a well-developed crypt upon each side of these points. Those in the anterior circumference are less accentuated than those situated posteriorly. This fact has been utilized by Ball to explain why fissures occur so much more frequently just to one side of the posterior anal commissure than at any other point. Occasionally small masses of fecal matter or foreign bodies are arrested in these little pockets and produce much local and reflex irritation; such accidents are comparatively rare, although certain irregular practitioners have made great capital out of them, and ascribe almost every disease of the intestinal canal to these pockets. The function of these valves is practically unknown. They have been considered as reservoirs for the mucus or lubricating material of the rectum, but frequent examinations at periods remote from defecation have failed to demonstrate any accumulation of mucus in them. Moreover, their epithelial lining contains no mucus-producing cells, which indicates they do not secrete the material. They are best seen in the living subject by the use of a conical fenestrated speculum, into which is introduced a small laryngeal mirror. On the margin of these valves are seen the small papillæ which have been described in connection with the anal canal.

The Valves of Houston or the Rectal Valves.—The mucous membrane of the rectum above the crypts of Morgagni is thrown into irregular horizontal folds, most of which entirely disappear when the organ is distended. At three or four points in the organ, however, these folds become more prominent when the gut is distended, and extend out into its cavity in a crescentic form.

Houston (Dublin Hospital Reports, 1830, vol. v, p. 158) first described these folds as valves of the rectum. They vary in number from

one to five. Ordinarily there are three, termed the superior, the middle, and inferior valves of the rectum. The middle one is the most constant. It arises from the right anterior quadrant of the rectal wall about 6 to 9 centimeters ($2\frac{3}{8}$ inches to $3\frac{9}{16}$ inches) above the margin of the anus. Kohlrausch described this fold as the "plica transversalis recti," but there is no occasion to confuse the reader by introducing any new nomenclature. As Testut says, the name originally applied to them by Houston "is rendered sacred by long usage." As described by Kohlrausch, Testut, Otis, and others, this middle valve varies in height according to the depth of the peritoneal cul-de-sac, being always just below the latter.

The inferior valve is located upon the left posterior quadrant 25 to 30 millimeters (1 to $1\frac{1}{8}$ inches) above the margin of the anus, and the superior valve is located in the same quadrant, slightly more to the side, at 9 to 11 centimeters ($3\frac{3}{8}$ to $4\frac{3}{8}$ inches) above the anus (Fig. 23). At the juncture of the rectum with the sigmoid, opposite the third sacral vertebra, there is always a well-developed fold or valve which more nearly occludes the caliber of the organ than either of the others. This valve was originally described by O'Beirne, who attributed to it the function of maintaining the fecal mass in the sigmoid flexure until just before the crisis of defecation. It is situated somewhat anterior, and to the right or left side, according to the di-



FIG. 23.—ILLUSTRATING USUAL LOCATION OF HOUSTON'S VALVES.

White dotted line shows height to which the peritoneal *cul-de-sac* is raised when bladder is distended.

rection of the flexure of the sigmoid upon the rectum. It is more marked in those cases in which this flexure is acute, and in such cases obscures any view of the sigmoid through the rectum.

The rectal valves protrude into the cavity of the organ to various extents. They are attached to the wall of the gut from one-third to one-half of its circumference; they are crescentic in shape, and present for consideration two surfaces, a free border, a base, and a central body. The superior surface of each valve appears as a smooth, inclined plane, slightly depressed in its center. In abnormal conditions this depression may become quite marked and capable of retaining fecal or foreign substances. The inferior surface of the valve corresponds to the superior, being more or less convex, according to the concavity of the latter, and is separated from it by the mucous membrane and tissues which compose the body of the valve. The free borders of the valves are crescentic in shape, clearly defined, and directed toward the cavity of the rectum. In the normal condition they are usually thin, flexible, and easily pushed aside. Owing to the arrangement of the valves at different levels, these edges overlapping give to the rectum, when dilated and viewed through the proctoscope, an appearance somewhat like a turbine wheel (Fig. 24). The bases of the valves where they join the rectal wall are convex, and considerably thicker than the free border; they are ordinarily opposite one of the grooves in the external rectal wall, as shown in the casts, but this arrangement is not invariable. Their attachment to the rectal wall is not upon a horizontal plane, but slightly higher on one side than on the other, thus furnishing a sort of inclined plane, which contributes to the easy passage of the fecal material over them. As Houston stated in his original paper, the valves consist of two folds of mucous membrane separated by cellular tissue and muscular fibers. The mucous membrane covering them differs in no wise from that covering the rest of the rectum in normal conditions. The structures composing the body of the valves between the layers of mucous membrane have been minutely described by Martin (Philadelphia Medical Journal, 1899), Pennington (Journal of the American Medical Association, December, 1900), and more recently by Testut (Traité d'anatomie humaine, 1901).

Martin claims to be the first to have discovered fibrous tissue in the valves, and has based an elaborate theory of constipation upon their abnormalities. Pennington removed a large number of recta from children and adults indiscriminately, and submitted them to Prof. William A. Evans for examination. The latter demonstrated the presence of these valves in each individual case; he located the most prominent one just below the level of the peritoneal *cul-de-sac*, and the next most prominent, "that which contracted the caliber of the gut chiefly" at the juncture of the rectum and the sigmoid, just as we have described above. The muscularis mucosa was found to be more prominent in the valves than elsewhere; the submucosa was composed of loosely arranged

connective tissue, quite vascular, devoid of lymph elements, and almost twice as thick as elsewhere in the rectal wall. The circular muscular coat was found to dip well into the valves, and measured from two to



FIG. 24.—INFERIOR AND MIDDLE VALVES OF HOUSTON.
As seen through the proctoscope.

four times as thick here as elsewhere. The longitudinal muscular fibers were found to be very irregular in their behavior, sometimes passing

over the depressions formed by the entrance of the circular fibers into the valves, and sometimes dipping into these grooves. This is in harmony with the observations of Lamier referred to in describing the longitudinal muscular coat of the rectum.

Evans describes numerous unusual conditions and abnormal developments in the valves. While these minute studies of the anatomical structure are interesting, they have no practical value for the surgeon beyond confirming the statements of Houston that the structures are not simple mucous folds, but true valves composed of mucous membrane, cellular and fibrous tissue, and possessed of circular muscular fibers. It is a

singular fact that in none of the examinations thus far made has it been shown that the peritonæum dipped into the groove at the base of the valve. The illustration (Fig. 25) shows the extent to which these valves may develop, together with their oblique attachment to the rectal wall.



FIG. 25.—ABNORMAL DEVELOPMENT OF VALVES OF HOUSTON.

Drawn from specimen furnished the author by Dr. J. R. Pennington.

The function of these valves is to support the fecal mass in its passage through the rectal canal, and, being so arranged as to present to the mass an inclined plane passing circularly around the rectum, they impart to it a rotary or corkscrew motion by which it is deposited from one valve upon the upper surface of the valve below until it reaches the anus. Martin and Pennington have experimented by introducing lubricated cotton-balls into the sigmoid flexure, and have observed their passage downward through the rectum by the aid of the proctoscope. They state that

the balls slip from the sigmoid into the rectum and lodge against the first valve; they are then carried by a rotary motion downward and forward to the middle valve, and then by the same motion they are deposited posteriorly upon the lower valve, and finally from this valve upon the internal sphincter or into the mouth of the instrument through which they were observed during the process. Thus, apparently, gross and microscopical anatomy and clinical observations all tend

to confirm more and more Houston's original claims as to the existence and functions of these valves.

Vascular Supply.—*Arteries.*—The rectum receives its blood supply from four sources: the superior, middle, and inferior hæmorrhoidal, and the middle sacral arteries.

The *superior hæmorrhoidal* artery is the terminal division of the inferior mesenteric which has its origin in the aorta just below the nephritic artery. It descends in front and slightly outside of the right internal iliac, and is embedded in the two folds of the mesentery. At about the level of the promontory of the sacrum it gives off the sigmoidal artery (Fig. 26) which supplies the lower portion of the sigmoid; it passes

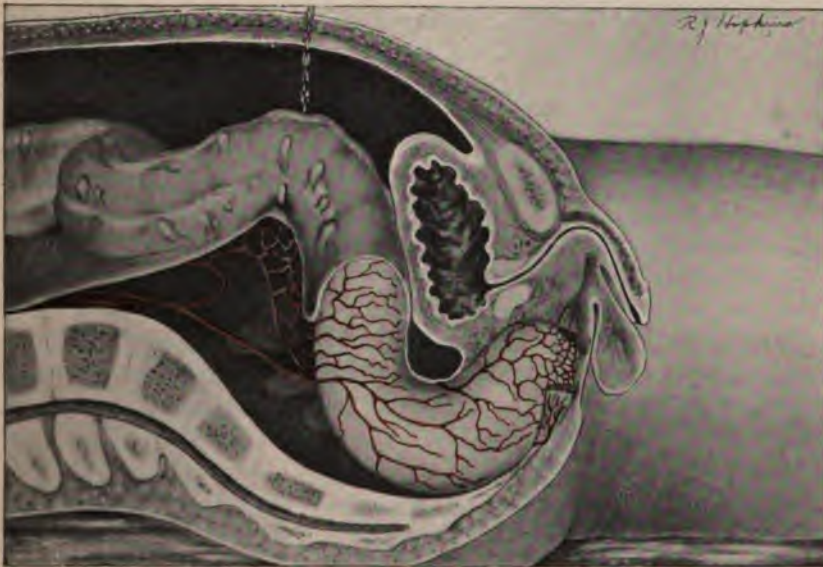


FIG. 26.—INFERIOR MESENTERIC ARTERY GIVING OFF SIGMOIDAL BRANCH AND TERMINATING IN SUPERIOR HÆMORRHOIDAL.

Distribution of latter to the rectum and its anastomosis with middle hæmorrhoidal artery.

downward between the folds of the mesorectum, and divides about the level of the second piece of the sacrum into two, sometimes three divisions, which pass, one upon the right and one upon the left side of the rectum; the left branch is distributed to that side and to the anterior surface of the gut, the right branch is distributed to the right side and posterior surface of the gut. About $4\frac{1}{2}$ inches above the margin of the anus these vessels penetrate the muscular wall of the gut, after which they divide into numerous branches, and descend to the lower limits of the rectum, where they terminate. The trunks of the vessels run more or less parallel with the long axis of the gut, and their capillary divi-

sions pass around the intestine, freely anastomosing with one another. They also anastomose with branches from the middle hæmorrhoidal and middle sacral arteries.

The middle hæmorrhoidal artery is extremely variable in its origin. It generally arises from the hypogastric artery, but may arise from the internal iliac or the prostatic. It is situated above the levator ani muscle, and passes through the superior pelvi-rectal spaces, distributing some branches to the anterior surface of the rectum, to the seminal vesicles and prostate in men, and to the vagina in women. It supplies the levator ani muscle, and furnishes a distinct anastomotic circulation with the superior hæmorrhoidal artery, which in cases of injury to the latter vessel would afford an adequate circulation to the lower end of the rectum.

The inferior hæmorrhoidal artery arises from the internal pudic and crosses the ischio-rectal fossa obliquely from the posterior portion of its outer wall; it divides into a number of branches which supply the lower portion of the levator ani, the external and internal sphincters, the skin, and superficial fascia around the anus. The branches of one side anastomose with those of the other, and with branches of the middle hæmorrhoidal artery. They also anastomose in a very mild degree with the lowest branches of the superior hæmorrhoidal artery.

The middle sacral artery arises from the posterior portion of the aorta at its bifurcation, and descends along the middle line in front of the sacrum, terminating in a minute branch which supplies the gland of Luschka; it gives off branches which pass through the cellular tissue to supply the posterior surface of the rectum. Its branches anastomose with the branches of the superior hæmorrhoidal and the lateral sacral arteries.

Veins.—The veins of the rectum correspond in name and course to the arteries, but they return the blood through two entirely different channels—viz., the portal vein and the inferior vena cava. The internal or superior hæmorrhoidal veins collect the blood from the rectum proper and empty it through the mesenteric vein into the portal circulation. The middle and external hæmorrhoidal veins (Fig. 27) and the middle sacral veins collect the blood from the external surfaces of the rectum and anus and empty it into the general circulation through the vena cava. The internal hæmorrhoidal plexus forms the venous supply of the rectum proper. The ano-rectal line marks the beginning of these veins above and the external veins below. This line, as Otis has happily said, provides a sort of watershed between the two circulations of such low altitude that under certain conditions it does not interpose a sufficient barrier to prevent an intermingling of the two streams. The two systems are connected at this point through anastomotic branches which are so narrow in early life as to be almost imperceptible.

Cripps (*op. cit.*, p. 26) says he has demonstrated that the internal hæmorrhoidal plexus can not be injected through the iliac veins, but it can be injected through the inferior mesenteric vein, and the blood will not pass on into the external veins, so that if any communication exists between the two systems it must be protected by valves. Quénu and Testut have both demonstrated the existence of valves in these anastomotic veins in the adult, and thus in part corroborate the views of Cripps, but they state that the inferior hæmorrhoidal plexus can be injected through the inferior mesenteric veins. The author has demonstrated the fact that the external plexus can be injected from the inferior mesenteric veins in old subjects who have suffered from constipation and hæmorrhoidal disease. Indeed, the communication between these two systems is often apparent to the naked eye in operations upon



FIG. 27.—EXTERNAL AND MIDDLE HÆMORRHOIDAL VEINS ARISING FROM THE ANAL CANAL AND LOWER END OF THE RECTUM; ALSO BRANCHES RUNNING UPWARD TO FORM SUPERIOR HÆMORRHOIDAL VEINS.

mixed hæmorrhoids, and it is no longer necessary in the light of such positive facts to further discuss this question of anastomosis.

Just above the ano-rectal line in the submucous tissue there are numerous small venous sacs or pools (Fig. 28), bulbous or elliptical in shape, and each about the size of a grain of wheat. These little pools surround the rectum, some at a higher and some at a lower level, and practically form the beginning of the internal hæmorrhoidal plexus. Duret (*Archiv. gén. de méd.*, December, 1879 and 1885) states that these little pools are arranged like clusters of grapes in the columns of Morgagni. The dissection made by the writer, however, shows that they entirely surround the rectum, and are not particularly aggregated in the columns. From these pools the small veins proceed in all direc-

tions to form an intricate network of vessels surrounding the rectum. Above the margin of the internal sphincter they unite to form larger trunks, which approach the arteries, and with them penetrate the muscular wall of the gut; the venous trunks unite above this point to form

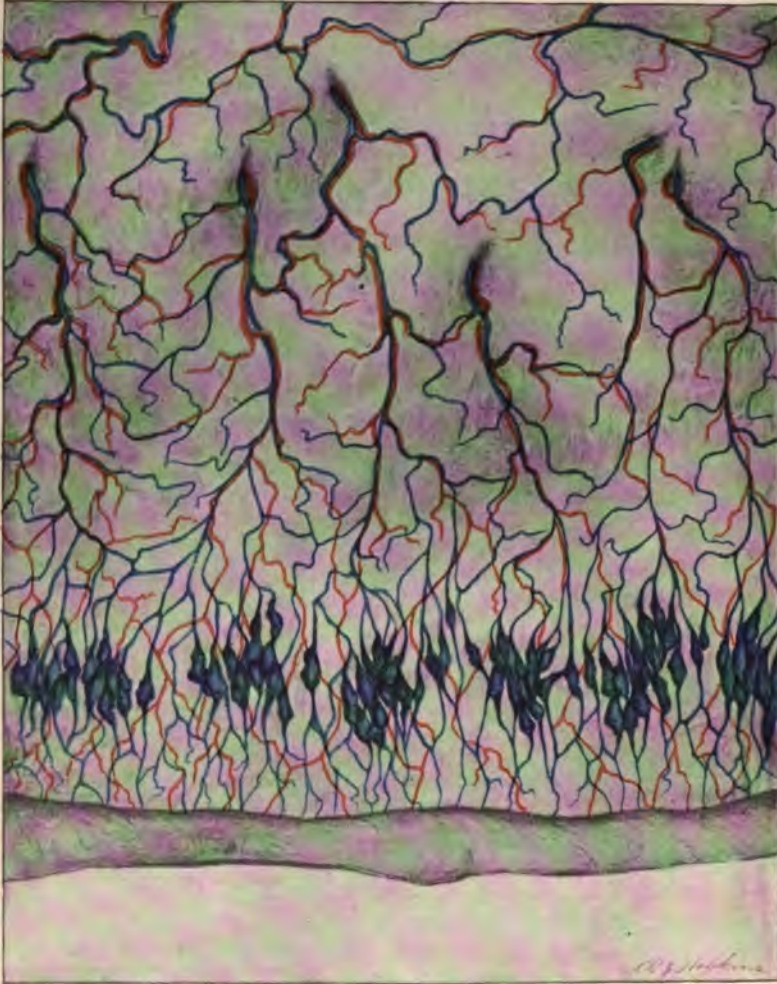


FIG. 28.—VASCULAR SUPPLY OF LOWER END OF RECTUM (PARTLY SCHEMATIC).
Showing venous pools in which internal hæmorrhoidal plexus originates.

the inferior mesenteric vein which empties into the portal circulation. These veins are without valves.

Verneuil has advanced the ingenious theory that the contraction of the longitudinal muscular fibers, at the points where the vessels perforate the rectal wall, serves to supply the place of the valves, and inci-

dentally he claims that the spasms of these muscles, causing obstruction in the veins, have a potent influence in the production of internal hæmorrhoids. It is impossible to confirm or deny this theory, as the facts are not demonstrable.

The middle hæmorrhoidal veins arise from the anterior surface of the rectum above the levator ani muscle, the seminal vesicles and the prostate in men, and the vaginal wall in women. The capillaries unite into larger trunks and follow the course of the arteries through the pelvi-rectal spaces, and empty sometimes into the hypogastric and sometimes into the ischiatic veins, but always finally into the general circulation through the vena cava.

The external hæmorrhoidal veins originate in the small anastomotic capillaries in the anal canal; they become more or less dilated as they pass outward over the border of the external sphincter, but immediately narrow down and unite with the subcutaneous capillaries of this region to form trunks which empty into the external pudic vein, through which they are connected with the general circulation.

The Nerve Supply of the Anus and Rectum.—The anus and rectum receive their nerve supply both from the great sympathetic and cerebro-spinal systems. The rectum proper is largely supplied by the sympathetic system; it receives branches from the mesenteric, sacral, and hypogastric plexuses. It also receives filaments from the third, fourth, and fifth sacral nerves. The mucous membrane of the rectum becomes less and less sensitive from below upward, thus indicating the absence of sensitive fibers in this portion of the gut, a fact which has been corroborated by microscopic and anatomical research.

The nerve supply of the muscular apparatus of the anus and rectum arises from the intricate plexuses formed by the second, third, fourth, and fifth sacral nerves (Fig. 29). The filaments from these nerves unite, separate, and reunite so often that it is impossible to determine the exact origin of any of the final trunks of distribution. According to Morestin, Langley, Anderson, and Testut, the levator ani receives its three filaments from the third and fourth sacral nerves. The first two filaments are distributed, one to the posterior or ischio-coccygeal portion, and the other to the anterior or levator ani proper; the third filament passes beneath the muscle and gives off branches to its lower surface, and passes onward to supply some small filaments to the superficial surface of the external sphincter.

The external sphincter muscle receives its nerve supply from three sources; two filaments from the branches formed by the third, fourth, and fifth sacral nerves extend transversely across the ischio-rectal fossa, and distribute themselves to the middle portion of the muscle and to the perianal cutaneous surfaces; a filament which comes off from the

internal pudic, just before its division into terminal branches, supplies the anterior portion of the muscle, and is called the anterior *sphincterian* nerve; while a filament coming off from the fifth and sixth sacral nerves passes down into the hollow of the sacrum between the levator ani muscle and the recto-coccygeus ligament, and finally

reaches the posterior superficial surface of the external sphincter. Morestin calls this the lesser *sphincterian* nerve. All these filaments possess both sensitive and motor fibers, and with them are distributed filaments of the sympathetic nerve. The central origin of the nerve supply of the anus and rectum is said to be located about the level of the first lumbar vertebra. This center is practically the same as that of the genito-urinary apparatus, which fact accounts in a large measure for the various reflexes between the two systems. The inhibitory center of this nerve supply is



FIG. 29.—SPINAL NERVES OF THE RECTUM AND ANUS.

situated in the brain, but the exact location is unknown.

Lymphatics of the Anus and Rectum.—The lymphatics of the anus and rectum are very difficult to demonstrate by dissection. Occasionally cases have been found in which the vessels and glands have become inflamed and thickened, and thus the seat and course of these particular vessels have been traced. Quénu (Bull. de la Société anatomie, Paris, 1893, p. 399) has shown that these organs are supplied with three sets of lymphatics practically corresponding to the arterial supply. The sacral or superior plexus of the lymphatics originates in the submucous and mucous portions of the middle and upper rectum posteriorly. They follow the course of the vessels, the lymphatic ganglia lying in close apposition

with the hæmorrhoidal veins. Between the rectum and the anterior surfaces of the sacrum and coccyx is found a chain of lymphatics which extends upward in the cellular tissue between the folds of the mesentery, and is thus connected with the prevertebral lymphatic system.

The middle hæmorrhoidal vessels are also accompanied by a chain of lymphatics which follows their course and ends in the hypogastric lymphatic plexus. These lymphatics originate in the anterior portion of the rectum, and,

passing outward above the levator ani muscle between the rectum and the prostate in the male and along the circular vaginal veins in the female, they finally reach their destination in the hypogastric plexus.

Quénu says it appears from his dissections that the middle portion of the rectum is connected with the lymphatics of both the sacral and hypogastric plexuses.

The lymphatics of the anal and perianal region are very numerous. They are connected by anastomotic branches with the lower lymphatics of the rectum. They do not follow the course of the external hæmorrhoidal veins very closely, but ramify beneath the skin, the chief branches passing forward and upward between the scrotum and the thigh, and



FIG. 30.—LYMPHATICS OF ANAL AND PERIANAL REGION.



FIG. 31.—SHOWING CONNECTION BETWEEN PERIANAL AND INGUINAL LYMPHATICS.

passing forward and upward between the scrotum and the thigh, and

finally unite with the inguinal lymphatics (Figs. 30, 31). It has not been demonstrated whether or not this chain is directly connected with the inferior chain of the lymphatics below Poupart's ligament. The importance of the lymphatic system about the anus and rectum will be appreciated when we come to study the subject of infectious and malignant diseases of these organs. Clinical experience corroborates the anatomical studies of Deaver, Quénu, and Moreau (*Bull. de la Société de biologie*, 1894, p. 812) with regard to the origin and distribution of the lymphatic system.

Retro-rectal and Superior Pelvi-rectal Spaces.—To comprehend the relations of the rectum one must thoroughly understand the cellular spaces surrounding it. That portion of the organ below the peritoneal attachment and above the levator ani is surrounded in its entire course by a cellulo-fibrous layer, in which ramify the blood-vessels, nerves, and lymphatics before they penetrate the walls of the organ. This layer forms a complete sheath to the rectum, and extends from the peritoneal fold down to the superior surface of the levator ani muscle. It is longer behind than in front. The fibrous portion of this sheath is outside of the cellular, and originates in the fasciæ lining the true pelvis; it passes off from the pelvis in a double layer at the points where the lateral sacral arteries diverge, and the inner layer attaches itself more or less firmly to the sides of the rectum at about the middle of its circumference. These folds represent the lateral ligaments of the pelvic rectum, as described by Jonnesco and Ombredanne, and are the chief supports of this portion of the organ. The outer layer of this fascia proceeds along the border of the sacrum and is attached to this bone. Between these layers posteriorly, separating the rectum from the sacrum, is a comparatively thick cellulo-vascular area which extends to the superior fascia of the levator ani below, and upward between the layers of the mesorectum, thus becoming continuous with the prevertebral cellular layer of the abdominal cavity (Fig. 32). This cellular space is termed the retro-rectal space, and has been compared by Ombredanne to the prevesical space of Retzius.

Anteriorly the rectum is also surrounded by a cellular space above the levator ani muscles, which is separated from the retro-rectal space by the latero-rectal ligaments which we have just described. This space separates the rectum from the bladder, prostate, and seminal vesicles in men, and from the broad ligaments and uterus in women. It is bounded in front by the prostatoperitoneal aponeurosis, which contains a certain number of muscular fibers. This aponeurosis is closely attached to the prostate, passes loosely over the seminal vesicles backward, and is attached to the sides of the rectum along with the latero-rectal ligaments. It is also attached to the anterior wall of the rectum, thus divid-

ing this anterior cellular space into two portions. The spaces thus formed are more closely connected with the genito-urinary apparatus than with the rectum, although they form the anterior boundary to the latter organ. They are known as the superior pelvi-rectal spaces (Fig. 22). It is in them that abscesses originating in the prostate, seminal vesicles, uterus, and broad ligament often develop. It is not pretended that the division between the retro-rectal and pelvi-rectal spaces is so firm that it can not be broken down, or that abscesses developing in one may not penetrate the other. As a rule, however, those developing in the retro-rectal space will burst into the ischio-rectal fossa or burrow out through the obturator foramen before they invade the anterior spaces; and those developing in the superior pelvi-rectal spaces will burrow upward and forward, often opening in the inguinal region or through the abdominal wall before they invade the retro-rectal space. These spaces are separated from the ischio-rectal fossæ by the levator ani muscle and its limiting fasciæ. The ischio-rectal fossæ which surround the anus and lower portion of the rectum have been described in the preceding pages.



FIG. 32.—EXAGGERATED RETRO-RECTAL CELLULAR SPACE.

The Relations of the Rectum.—The rectum is in relation at its different levels with the various organs and tissues of the pelvic cavity. The lower or prostatic portion is in relation anteriorly with the prostate and membranous urethra in men, and in women with the vaginal wall. As the rectum turns backward at its lower end, and the uro-genital organs forward, the space left between the two comprises the uro-genital triangles or perineal body. Laterally this lower portion of the rectum

is in relation with the external sphincter, the levator ani muscle, and the limiting fasciæ of the ischio-rectal fossæ. Posteriorly it is in relation with the levator ani, the external sphincter, and the recto-coccygeus muscles, and with the fibro-cellular tissue separating it from the coccyx and the gland of Luschka.

The upper or peritoneal portion of the rectum is in relation anteriorly with the bladder and upper portion of the prostate and seminal vesicles in men, and with the vagina in women. Above these points is the peritoneal *cul-de-sac* called the prostatovesical *cul-de-sac* in men, and Douglas's pouch in women. These *culs-de-sac* contain the sigmoid flexure, loops of the small intestine, and various abdominal organs, as has been already described. The anterior surface of the rectum above this point is therefore in relation with these organs.

Laterally, below the reflection of the peritonæum upon the sides of the pelvis, the rectum is surrounded by a cellular layer containing the hypogastric nerves and the lateral sacral arteries, which pass outside of it in the fibrous sheath. Posteriorly this portion of the rectum is separated from the sacrum and coccyx by the cellular tissue, occupying the retro-rectal space. On each side posteriorly it is in contact up above with the sacral plexus and sympathetic ganglia, and also with the fascial origin of the pyramidal muscles. At its lower end it comes in contact with the gland of Luschka. It is important to observe that the organ, while related to the pelvic contents, is not so closely attached to any of them that it can not be removed without injury to vital parts.

The Supports of the Rectum.—According to the division which we have adopted the rectum is practically a fixed organ. It may vary in caliber and shape according to various circumstances, but unless displaced by pathological conditions, it remains always in one position. It is held in this position by active and passive supports. The active supports are found in the muscular fibers of the gut itself, in the external sphincter, levator ani, and recto-coccygeus muscles. The passive supports consist of connective-tissue fibers, which bind the rectum to the surrounding organs or tissues, in elastic-tissue bundles formed by the peritoneal fold, and finally by the blood-vessels which supply the organ.

The chief support of the lower portion of the rectum comes from the levator ani and external sphincter muscles, together with its fibrous attachments to the coccyx, prostate, or vagina. The middle portion is held in position by the lateral fibrous sheaths, which pass off from the sacrum and ilium along the course of the lateral sacral arteries. The superior portion is held in position by the peritoneal folds which pass from the organ and are reflected upon the bladder or uterus in front, upon the pelvic walls laterally, and unite posteriorly to form the mesorectum and attach the organ to the anterior surface of the sacrum. This

part of the organ also receives a certain amount of support from the inferior mesenteric arteries and the fibrous sheaths which surround them.

The Sigmoid Flexure or Pelvic Colon.—This loop of the large intestine, termed also the omega loop, and by French writers the pelvic colon, begins above at the termination of the descending colon near the outer border of the left psoas muscle, and comprises all that portion of the intestinal canal between this point and the upper termination of the rectum opposite the third sacral vertebra.

As ordinarily measured *in situ*, it is about 19 inches in length, but when removed from the body and stretched out upon its mesentery this length is considerably increased.

It originates in the left iliac fossa, passes downward for 2 inches parallel to the external border of the psoas muscle; it then crosses transversely to pass into the pelvic cavity, which it occupies for the greater portion of its extent; passing across this cavity from left to right, and slightly upward, it reaches the lower margin of the right iliac fossa; from this point it passes downward, backward, and inward along the anterior surface of the sacrum to its junction with the rectum. It is attached to the posterior wall of the abdomen and pelvis by a peritoneal fold called the mesosigmoid, which is continuous with the mesocolon, but is much longer than the latter, thus giving the sigmoid greater mobility than any other portion of the large intestine. This mobility explains the great variation in its situation, direction, and relations, as described by different authors.

The sigmoid is divided into four portions: The first portion is vertical; the second is transverse; the third forms a long loop with its concavity directed upward when the sigmoid occupies the pelvis, and downward when it is lifted up into the abdomen; the fourth is irregularly curved, and descends into the hollow of the sacrum, downward, backward, and inward.

From this description it will appear that the sigmoid joins the rectum from the right side of the pelvis instead of the left, as is held by most authors. For a long time the author has taught and demonstrated the fact that the intestine at the juncture of the rectum and sigmoid turns to the right quite as frequently as to the left. The anatomical and clinical studies of Testut, Schifferdecker, Jonnesco, Treves, and others prove that this is in reality the most frequent disposition.

The walls of the sigmoid are composed of four layers, the mucous, submucous, muscular, and serous.

The Mucous and Submucous Layers.—The mucous and submucous layers differ in no wise from those of the rectum, except that the solitary follicles are less frequent, and the membrane in its entirety is not quite so thick as in the lower organ.

The Muscular Layer.—The muscular layer consists of circular and longitudinal fibers. The circular fibers are distributed around the sigmoid much more equably than around the rectum. While there are certain points or flexures in the gut where aggregations of these fibers take place upon one side, these aggregations never completely surround the gut, nor are they ever so marked as to produce any idea of a sphincter muscle.

The longitudinal fibers, arranged at first in three bands as in the descending colon, gradually assume the form of an anterior and a posterior band, which spread out as they approach the recto-sigmoidal juncture, and form a more or less complete layer around the gut.

Serous Layer.—The peritoneal layer of the sigmoid flexure surrounds the gut similarly to that of the small intestine, and its folds, coming in contact with each other posteriorly, form the mesosigmoid or ilio-pelvic mesocolon. This mesentery is quite short in its iliac portion, but rapidly becomes longer, reaching its maximum about the middle portion of the pelvic loop, where it again grows shorter, and finally terminates at the juncture of the sigmoid with the rectum. The lower portion of this mesentery, as already stated, is called the mesorectum.

The line of insertion of the mesosigmoid into the pelvic and abdominal walls may be described as follows: Beginning above at the external border of the psoas (Fig. 33), it follows this line downward to a point about 2 to 3 centimeters ($\frac{3}{4}$ to $1\frac{3}{8}$ inch) above the crural arch; here it crosses the psoas muscle from left to right, and turning upon itself follows the internal border of the muscle upward and inward as high as the fifth or fourth lumbar vertebræ, where it again bends downward and inward, crossing the right common iliac artery, and reaches the median line on a level with the sacro-vertebral juncture. From this point it descends in the median line as far as the third sacral vertebra, where it ends. Sometimes the attachment of the mesosigmoid extends across the middle line, passing over the fifth lumbar vertebra almost to the internal border of the right psoas muscle, and then turns downward and inward, following the anterior surface of the sacrum to the beginning of the rectum. Between the two layers of this fold there is a thin, cellular layer, through which the blood-vessels, nerves, and lymphatics of the intestine pass.

In a certain number of cases the mesosigmoid, after turning downward at the lumbosacral juncture, passes toward the left until it reaches the sacro-ischiatic symphysis, and then turns backward toward the median line of the sacrum. It is this distribution which led to the first descriptions of the rectum as beginning at this point. Such an arrangement, however, is far from being the most frequent one.

Intersigmoid Fossa.—When the sigmoid is turned upward one sees

at the point where the mesosigmoid crosses the iliac artery a circular orifice, 10 to 15 millimeters in diameter, which leads into a funnel-shaped *cul-de-sac* called the intersigmoid fossa (Fig. 34).

This *cul-de-sac* was first pointed out by Hensing and Roser. It is situated at the parietal insertion of the mesosigmoid and a little to the

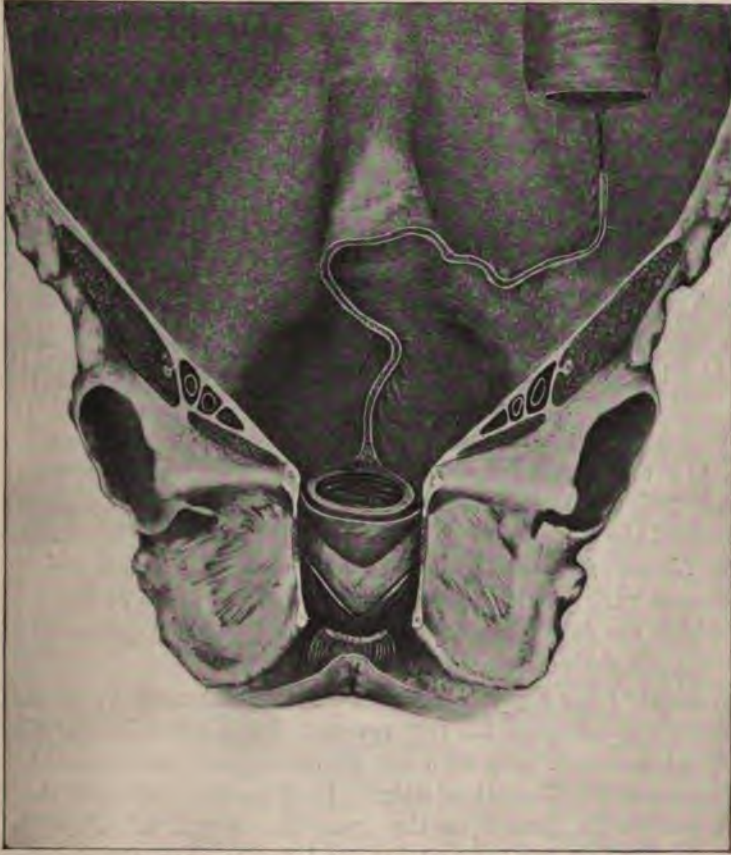


FIG. 33.—LINE OF ATTACHMENT OF THE MESOSIGMOID.

left of the median line. Its direction is obliquely upward, and from left to right in the line of the iliac artery. Its depth varies from 3 to 6 centimeters ($1\frac{3}{8}$ to $2\frac{3}{8}$ inches), but occasionally it extends much deeper. Around this orifice are situated the iliac artery below, and the mesenteric or three sigmoidal arteries above and at the sides. It is an important guide, therefore, in pelvic operations to indicate the location of these vessels.

The sigmoid when empty ordinarily falls down in the recto-vesical space or Douglas's *cul-de-sac*, and occupies the pelvic cavity for the

greater portion of its extent. Under such circumstances it forms an acute flexure at its juncture with the rectum.

When distended with gas or fecal material it rises up in the abdominal cavity as high as the umbilicus, sometimes to the transverse colon, or even to the diaphragm; its distal end being carried across into the right iliac fossa, straightens out this angle between it and the rectum, and produces a comparatively straight channel through the two organs.

Whenever by adhesive bands, tumors, or any other conditions the sigmoid is prevented from rising up in the abdominal cavity, and thus straightening out this flexure, a mechanical difficulty in the passage of fecal material will be presented; as will be seen later on in the chapter upon Constipation, this condition of affairs is not at all rare.

Blood Supply.—The sigmoid flexure receives its blood supply from the sigmoid arteries, branches of the inferior mesenteric artery; they run circularly around the gut and anastomose with the colonic arteries above and the superior hemorrhoidal arteries below (Fig. 34).

Its veins follow practically the same course as the arteries, and empty their blood into the portal circulation through the inferior mesenteric vein.

The arteries enter the mesocolon at the sides of the intersigmoid fossa, and any injury at this point during operative procedures or through prolonged pressure from uterine tumors may be followed by gangrene of the sigmoid.

The Nerves of the Sigmoid.—The nerves of the sigmoid are of the sympathetic variety, with the exception of a few fibers of the sensory type, which are derived from the lumbar and sacral plexuses and distributed upon the posterior wall of the gut.

Relations of the Sigmoid.—Owing to the great mobility of the sigmoid flexure its relations are very various. In its upper or iliac portion it is in relation anteriorly with the abdominal wall, or separated from the same by loops of small intestine. Posteriorly it lies upon the iliac muscle and fascia, then upon the psoas muscle and left iliac vessels, then upon the last lumbar vertebra, and finally upon the right psoas muscle and the anterior surface of the sacrum. In its course across the pelvis it is in relation anteriorly with loops of small intestine, with the bladder in men, and with the uterus, ovaries, and fimbriated extremities of the tubes in women. Adhesions between the latter organs and the sigmoid are by no means uncommon, and account for a great deal of the pain which women suffer from constipation and intestinal accumulation of gases.

When empty the sigmoid lies almost entirely in the pelvic cavity, and is therefore called the *pelvic colon*. Under such circumstances it is in relation anteriorly and below with the bladder in men, and

with the uterus in women. Posteriorly it is in relation with the rectum and anterior surface of the sacrum in both sexes. Above it is in relation with the loops of the small intestine which rest upon it.

When the organ is much distended by gas or fæcal matter it rises into the abdominal cavity, and is there practically surrounded by loops

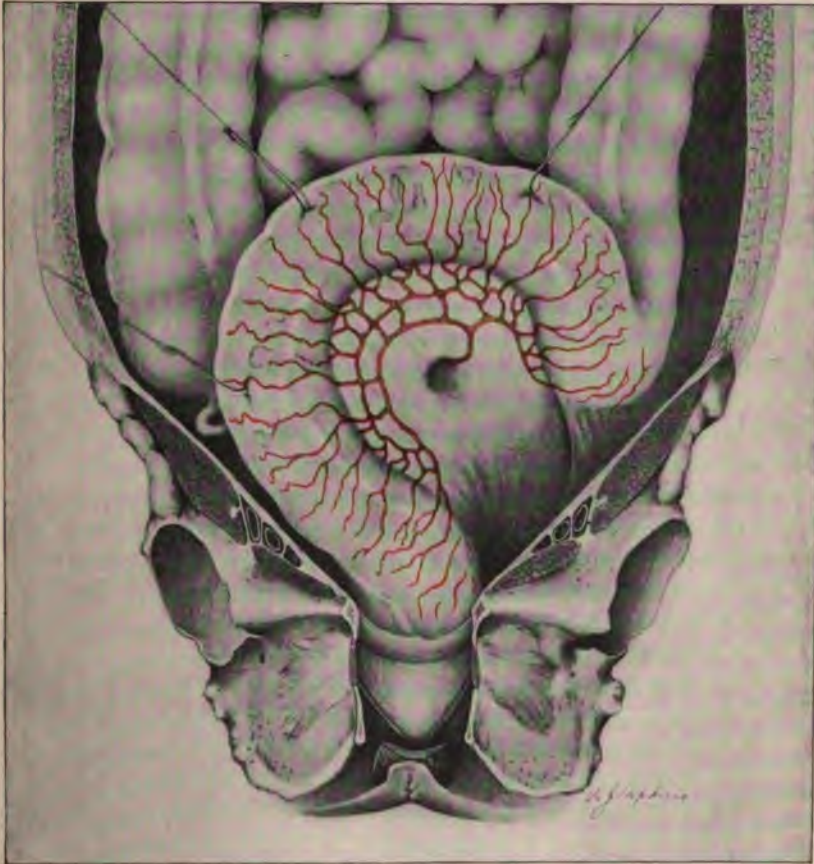


FIG. 34.—INTERSIGMOID FOSSA.
Showing left sigmoidal artery.

of small intestine and the abdominal wall (Engle, *Medicinische Wochenschrift*, Vienna, 1857, p. 647; Jacoby, *American Journal of Medical Sciences*, 1874; and Bouchard, *Thèse*, Paris, 1863).

Physiology.—The anus, rectum, and sigmoid, while forming a portion of the alimentary tract, take no part in the processes of digestion. The sigmoid and rectum are storehouses for the fæcal material after the process of digestion is complete. They are provided with a system of

glands or tubules which absorb from the mass whatever fluid or nourishing substances are left in it.

The functions of the anus consist in furnishing an exit for the faecal material and in controlling its discharge except at opportune moments. In normal conditions this exit is wide enough to admit of the passage of well-formed masses, and capable of closing sufficiently to retain absolutely fluid materials. It is governed by both voluntary and involuntary muscles. Normally the aperture is closed, but this closure may be rendered much more firm and resisting by voluntary action when exigencies require it. The organ relaxes and opens through the inhibition of sphincteric contraction ordinarily governed by will-power. It seems to be controlled by two centers: one in the spinal cord and the other in the brain.

Physical and anatomical experiments and a study of lesions of the cord show that the reflex center of the anus and rectum is located in the cord nearly opposite the base of the first lumbar vertebra in the very tip of the cord or *conus medullaris*.

The inhibitory center is situated in the brain. Injury to the chorda and more particularly to the *conus* is therefore followed by incontinence, while injury or disease above this region results in constipation. "Fæces or air in the rectum excite the lumbar center and cause two effects—contraction in the wall and relaxation of the sphincter. This process can be controlled by the will to a considerable extent, although we are still ignorant of the precise mode in which the voluntary influence is exerted. But if the volitional path in the cord is interrupted above the lumbar centers, the will can no longer control the reflex processes; as soon as the fæces irritate the rectum they will be expelled by the reflex mechanism. If the damage to the cord involves the sensory tract, the patient is unconscious of the action of the bladder or bowel. If the sensory tract is unaffected, the patient is aware of the process, but can not control it. It is often said that there is permanent relaxation of the sphincters, but this is true only when the lumbar centers are inactive or destroyed. In this condition evacuation occurs as soon as the urine or fæces enter the bladder or rectum. The urine escapes continuously instead of being expelled at intervals. The condition is less obvious in the case of the rectum, because there is no such continuous passage of fæces into the rectum as there is of urine into the bladder. We may, however, distinguish between the two states of the rectum by the introduction of the finger. If the lumbar center is inactive, there is a momentary contraction due to local stimulation of the sphincter, and then permanent relaxation. If, however, the reflex center and motor nerves from it are intact, the introduction of the finger is followed first by relaxation and then by gentle, firm, tonic contraction" (Gowers, *Diseases of the Nervous System*, vol. i, p. 246).

The functions of the rectum and sigmoid are practically the same. They are both receptacles or reservoirs for the faecal material after it has passed through the intestinal canal. The material is softer and more fluid in the sigmoid than in the rectum; it is also more constantly present in the former. It is not true, however, as is frequently stated, that the rectum is always empty except just before the period of defecation. It nearly always contains more or less faecal matter. The writer has made many examinations with regard to this fact, and, except in cases of impaction, he has never found a case in which the rectum was empty and the sigmoid well filled with faecal material. They both act as reservoirs, and a certain amount of faecal material is always present in them.

The theory and processes of defecation, together with O'Beirne's doctrine of retro-peristaltic action by which the faecal mass is lifted back into the sigmoid after it has once entered the rectum, will all be discussed in the chapter upon constipation, as they bear directly upon this subject. It is sufficient to state here that after a great many ocular examinations of the rectum and sigmoid, the author has never seen a case in which the faecal matter, having once entered the rectum, has been lifted back into the sigmoid flexure.

Owing to their glandular apparatus, both the rectum and sigmoid act as absorptive and secretive organs. The longer the faecal mass remains in them, the drier will it become through the absorption of its fluid materials by the Lieberkühn follicles. This absorptive action of the rectum is made use of by physicians for the stimulation or nourishment of patients when feeding by the stomach is impracticable. Certain medicinal substances seem to enter the circulation much more rapidly through this route than through the stomach. As examples, we may mention cocaine, belladonna, hyoscyamus, and opium. Whether absorption takes place through the blood-vessels, or through the epithelial cells, or through the intercellular substance between the individual cells, is not clear. Cripps (*op. cit.*, p. 16) doubts the existence of the intercellular substance, and says that "it is highly probable absorption takes place through the epithelial cells themselves. Possibly the nuclei of the columnar epithelium may be the means of taking nourishment into the body by escaping into the retiform tissue between the glands, and thus becoming lymphoid cells. According to this view, the columnar epithelial cells lining the rectal follicles have a far higher function than that generally assigned to them by physiologists, and instead of being employed in a simple secretion of mucus, they are in reality the parents of leucocytes of the body." This theory is interesting, and its author has produced some microscopic evidence in its favor, but the necessarily slow processes of such absorption are not in keeping with the rapid entry into the circulation of certain substances when introduced into the rec-

tum. Considering the large capillary and vascular supply of the rectum, it seems more probable that absorption takes place through these, and that the absorbed fluid enters directly into the circulation. The secretory functions of the rectum and sigmoid consist in secreting mucus in greater or less quantity, which lubricates the faecal mass when dry, and thus facilitates its passage with the least possible friction. The amount of mucus secreted depends upon the dryness and irritating qualities of the faecal material. In normal conditions it is barely perceptible, but in cases of chronic constipation or acute catarrhal inflammation, it becomes greatly exaggerated, and sometimes exhausting to the patient, even where it is not accompanied by discharge of blood or pus.

CHAPTER II

MALFORMATIONS OF THE ANUS AND RECTUM

WHILE the proportion of malformations of the anus and rectum in the total number of children born is very small, the actual number is far from inconsiderable. Moreau stated to the Paris Academy of Medicine that he had observed during a practice of forty years in the Maternity Hospital only four cases of imperforate anus. Couty, of Havre, in an experience of 3,500 confinements saw 3 cases. Collins, in the Maternity Hospital of Dublin, saw only 1 case in 16,000 children, while Zohre, of the Vienna Maternity Hospital, reported only 2 imperforations in 50,000 children born in that institution. In the Paris Maternity Hospital from 1871 to 1885 there were 5 cases of ano-rectal malformations in 20,600 births, and in the Cochin lying-in hospital during the same period there was only 1 case in 10,572 births. These facts agree in the main with the estimate of Starr, who stated that these malformations occurred about once in 10,000 births.

Authors differ as to their relative frequency in the two sexes. Thus, while Sédillot states that girls always furnish the greatest number of ano-rectal anomalies, Curling found in 100 such cases 58 boys and 42 girls; Bouisson in the same number of children found 53 girls and 47 boys. In our own collection of 140 cases so far as the sex was known there were 52 boys and 70 girls. If the cases of atresia ani vaginalis are included, the preponderance will be in favor of the female sex, but omitting these cases, there is no appreciable difference in the frequency with which malformations occur in the two sexes. These statistics all refer to gross malformations, and are not entirely accurate, inasmuch as many of these abnormalities are of a partial nature and present no physical symptoms calling attention to them in early life. As a consequence the victims often go to old age without knowing that any deformity exists.

The neglect of systematic examination of the rectum in new-born children by accoucheurs and midwives allows many of these minor malformations to go unobserved. Thus one sees quite frequently instances of congenital stricture, valvular occlusion, and rectal malformations in

persons who have reached the age of puberty, supposing they were anatomically perfect. Morgagni records a case of this kind in which a woman who lived to be one hundred years of age, was married, bore children, and performed all the duties of life without knowing she had any malformation until shortly before her death.

The importance of such examination and the early recognition of malformations can not be overestimated, for it is only in the earliest stages that we can hope to remedy the cases of complete occlusion, and it is at this stage also that we may do most to prevent the minor malformations proving serious in later life.

Welch, of Baltimore, has shown that the meconium at the time of birth and for some hours thereafter is a sterile fluid, but that after the digestive processes have taken place in the intestinal canal it becomes infectious and is no longer free from danger to surgical wounds. This fact would indicate the advantages of early operation from an aseptic point of view, for it is the rule in such operations that the meconium escapes into the wound and thus exposes the latter to whatever infectious germs it may contain. The large majority of deaths from operations of this kind are due to peritonitis or sepsis which follow the escape of the intestinal contents into the peritoneal cavity or wound. The earlier, therefore, that remedial measures are undertaken, the less danger will there be of septic infection.

In the section on embryology it was shown that the rectum and anus are developed from two entirely different layers of the blastoderm, that the blood supply of these two organs come from different sources and return by different routes to the general circulation. Arrest in the development of one, therefore, is not necessarily associated with that in the other; in the majority of cases where there is malformation or displacement of the rectum, the anus is ordinarily normal, and *vice versa*. On the other hand, malformation of either one of these organs is very likely to be associated with malformation in other parts of the body derived from the same layer of the blastoderm. Thus, children with malformations of the rectum are very likely to suffer with cleft palate, nasal and pharyngeal obstructions, or other abnormalities of the alimentary tract. Those with malformations of the anus are likely to be associated with malformations of the uro-genital organs, such as hypospadias, exstrophy of the bladder, atresia ani vaginalis, etc.: Other malformations, such as deformities of the pelvis, absence or twisting of the coccyx, close apposition of the tuber ischii, and absence or imperfect formation of the perinæum, may be associated with malformations of the rectum and anus. It is not within the scope of this book, however, to consider monstrosities, so the text will be restricted to those malformations affecting the rectum and anus only.

The classical division of these malformations was first laid down by Pappendorf in 1781, and has been closely followed by most writers since his day. In this classification the rectum and anus are considered as one and the same organ, and no distinction is made between malformations resulting from arrest of development in the parts originating in the epiblast and those originating in the hypoblast and mesoblast. As the writer has always observed this distinction, Pappendorf's division is modified as follows:

Malformations of the Anus

- a. *Entire absence of the anus.*
- b. *Abnormal narrowing of the anus.*
- c. *Partial occlusion of the anus.*
- d. *Absolute occlusion of the anus.*
- e. *Anal opening at some abnormal point in the perineal, scrotal, or sacral region.*

Malformations of the Rectum

- a. *Rectum entirely absent.*
- b. *Rectum arrested in its descent at a point more or less removed from the anus, the anus being normal.*
- c. *Rectum opening into some other viscus, with anus present in its normal position or absent.*
- d. *Rectum and anus normal, with the exception that the ureter, bladder, vagina, urethra, or uterus opens into the rectum.*

With this division we are able to clearly follow out the malformations due to the arrest of development in the different layers of the blastoderm.

MALFORMATIONS OF THE ANUS

a. Entire Absence of the Anus.

Cases in which the anus is entirely absent are comparatively rare.

The nurse or medical attendant when examining the child for sex will immediately recognize the entire absence of the anus, whereas if it is only partially formed the deformity is generally overlooked. In these cases there may be a depression in the skin at the point where the anus should be, but sometimes there is a small corrugated button of skin or protrusion at this point. At other times there is simply a slight discoloration, with more or less rugæ of the skin tissue centering around the normal point. Again, the skin or central rhaphe of the perinæum may extend in an unbroken line from the scrotum to the coccyx (Fig. 35). In such cases the rectum may reach down almost to the skin, it may open into some other viscus, or it may be arrested in its descent at a greater or

less distance from the point of the normal anus. The existence or absence of a depression at the point where the normal anus should be is no indication whatever of the distance at which the rectum will be found. In some cases where there is a marked depression, or even a well-formed



FIG. 35.—COMPLETE ABSENCE OF THE ANUS.

anus, the rectum will be found high up, whereas in other cases in which there is not the slightest indication of an anus the rectum will be found close to the surface of the skin. This fact is of importance from a practical point of view, showing that the absence or very slight development of the anus would be no indication for doing an abdominal operation for imperforation until a careful search through the perinaeum had been made.

Associated with this form of malformation we are likely to have other deformities in

the external genital organs, such as atrophy of the vagina, hypospadias, exstrophy of the bladder, and deformities of the pelvis. The *tuberi ischii* are likely to be unusually close together, and the pelvis itself may be so narrow and generally smaller than normal that the deformities will be observable from a simple inspection of the parts. The genital organs also may be set farther back toward the coccyx, and the space between the bladder and the sacrum may be so narrow that it would be almost impossible to insert the finger between them. These malformations it will be seen arise in tissues all having their origin, as the anus, in the epiblast, and may be independent of any deformities or arrests of development in the tissues arising from the other layers of the blastoderm.

Diagnosis.—Where the anus is absent there is no difficulty in recognizing the fact by sight. Where such observation is not made at the time

of birth it will soon be noticed that there is no passage of meconium or faecal matter; that the child is restless, and soon begins to strain; the abdomen becomes tense and swollen, and after a few days the child ejects its food, digested or undigested, according to the state of the stomach. With the first appearance of such symptoms, ocular and digital examinations are called for, and when these are made there is no difficulty to diagnose the malformation. As this is one of the types of imperforate anus, the consideration of treatment will be postponed until all have been described.

b. Abnormal Narrowing of the Anus.

In these cases the anus is present, and may appear perfectly normal to the superficial observer, but upon examination it will be shown that it is unusually narrow at some portion. This narrowing may take place at any point from the margin to its junction with the rectum, or it may extend throughout the whole length of the anus. As the length of the normal anus is from 1 to $2\frac{1}{2}$ centimeters ($\frac{3}{8}$ to 1 inch), the narrowing which can be properly attributed to it will be limited to this extent.

The narrowing may be annular and very short, being formed by bands or membranes extending from one side of the anus to the other, or it may extend from the margin to the upper limits of the anus, consisting in a general incapacity of the entire anal canal. This condition differs from the narrowing of later life produced by pathological causes in that there is no hypertrophy of connective tissue, no cicatricial tissue, and no hardening of the parts; the anus is soft and flexible, and its walls continue so upward to the rectum. The conditions attributable to inflammation may develop later on in life, owing to the passage of faecal matter through this abnormally narrow channel, and the consequent irritation therefrom, but in those cases which have been observed at the time of birth there has not yet been reported any evidence of pathological processes having taken place.

The question of the size of a normal anus at the time of birth is rather difficult to decide; it depends upon the size of the child, but in general one may say that the anal canal at birth ought to admit with comparative ease the little finger of a man's hand, or the index finger of a woman's. If the sphincters are normally developed they will be found to grasp the finger gently, and yet easily enough to admit its passage well into the rectum; where there is abnormal narrowing this sphincteric action is generally deficient, and one finds it difficult or impossible to introduce the finger through the contracted canal. These cases are the ones in which children are reported to have been constipated all their lives, and who frequently develop strictures or fissures in early life.

Pailhes, in a thesis before the medical faculty of Paris, discusses this subject at length from the point of view of congenital strictures. He

shows that many of these cases reach adult and even old age without discovering the true nature of their condition, and yet their histories and lifelong experiences would go to prove that the narrowing had existed at the time of birth. We must differ with Trelat, Reynier, and Pailhes in calling this condition stricture at the time of birth, because that term designates a pathological narrowing of a canal which has been of normal proportions, and they all disclaim any such process in its production. The pathological condition in these cases comes on after birth through obstruction and consequent irritation from the faecal passages. It is true when these cases are treated in adult and later life that the condition is then one of stricture with all its pathological accompaniments, and may be classed (as Pailhes has done) under the heading of congenital stricture, referring, of course, to its origin and not to its pathology; but the congenital feature consists in an abnormally small anal canal incapable of being dilated by the faecal mass.

Diagnosis.—The diagnosis of this condition is not so easy as that of total absence of the anus. There is generally more or less room for the passage of the meconium, and as gas escapes through very small passages, the child in early life is not much disturbed by its accumulation. As long as the faecal passages are semifluid, as they should be in infant life, these abnormal narrowings of the anus will produce no subjective symptoms; but as soon as the faecal material begins to be solid, obstruction and irritation will take place, and the patient will have to strain and suffer pain whenever a movement of the bowels occurs. Such children soon learn to dread the hour for being sent to the commode, and the result is a marked constipation with all its evil effects. The only absolute diagnosis of these malformations is that made by the eye and finger.

Serremone has called attention to congenital narrowing as a frequent cause of fissures, both in children and in adults. When these fissures are found in infancy, however, they must be clearly distinguished from those due to the dry, brittle mucous membrane found in hereditary syphilis. Digital examination in these cases will elicit a narrowing at one point or throughout the entire length of the anus. When the canal is large enough to admit the tip of the finger, the extent of the malformation and the density of the surrounding tissues can be easily told. When it is too small for such examination, the uterine probe or some such instrument can be passed through, and, being bent upon itself, one may be able to determine the nature and extent of the narrowing. The older the patient is, the more dense and inelastic will be the constrictures; and the more unyielding they are, the more distress will they occasion.

The child may pass through infancy and childhood with no other

symptoms than those of constipation. This, however, may alternate with a pseudo-diarrhœa—that is, the child may have impaction, and yet at the same time suffer from the frequent passage of fluid fæces around the fæcal mass. The author saw an interesting case of this kind some years since in a boy four years of age, who was brought to the clinic on account of the diarrhœa. He was having twenty to thirty passages daily, was emaciated, pale, and septic in appearance, his abdomen was greatly distended, and his physiognomy suggested tubercular enteritis. Examination under chloroform revealed a narrow tubular anus not large enough to admit the little finger, and incapable of being dilated without tearing. It was therefore incised posteriorly. Within the following hour he passed more than six pounds of hard, lumpy fæces. An examination of the child's rectum at birth would have shown this deformity, and persistent dilatation at that time would have prevented the suffering and necessity of operation.

Those cases in which the narrowing is not observed until in adult life can only be recognized as congenital from the subjective history. Kelsey (*Diseases of the Rectum and Anus*, p. 74) has related a case in which the condition was discovered at the age of thirty-eight. Trelat saw one at fifty-two, and the author has seen one at twenty-seven. None of these patients had any idea they were malformed. In general terms one may say an anus that will not admit a No. 5 Wales bougie in infants, or a No. 7 in adults, may be called abnormally narrow.

c. Partial Membranous Occlusion of the Anus.

This variety of malformation of the anus is not rare. It consists in a partial occlusion at some level of the anal canal by a membrane or fold of tissue. If the fold is situated at the margin or outside of the anal canal it is composed of skin. Sometimes it occurs in the shape of a central rhaphe extending from the scrotum to the coccyx, with a small opening on one side or both, at the point where the anus should be, thus allowing the passage of fluid fæces or meconium (Fig. 36).



FIG. 36.—MEMBRANOUS OCCLUSION OF THE ANUS.

When the occlusion is higher up, the membrane is composed of muco-

cutaneous tissue, and has a crescentic or circular shape with a small opening either in the middle or upon one side. These openings may be of considerable size, or barely large enough to admit a probe. The smaller the opening, the more likely it is to produce constitutional and subjective symptoms early in life. When the membrane is situated as high as $1\frac{1}{2}$ to 2 centimeters ($\frac{3}{8}$ to $\frac{1}{2}$ of an inch) from the margin of the anus, it will be due probably to imperfect absorption of the ano-rectal membrane. Such cases, however, must be distinguished from those in which there is an abnormal fold lower down. These cases have been described as congenital strictures, but should be classified under the head of congenital malformations. As in the previous class, they have neither the pathological nor physical characteristics of stricture. They are generally observed earlier in life than the preceding class, and are much more easily dealt with, in that they do not involve the deeper layers of the anal wall. When attention has been once called to them the diag-

nosis is easy, because all of the malformation is within reach of the finger or the probe, as well as within ocular observation. They are frequently seen in adult life, and produce so little disturbance that they are of no surgical importance (Fig. 37).

d. Complete Obstruction of the Anus by a Membranous Diaphragm.

The distinction between this and the last variety of malformation of the anus is simply one of degree. The former represented a



FIG. 37.—PARTIAL MEMBRANOUS OCCLUSION OF THE ANUS.
Observed in a man forty-two years of age.

partial occlusion not immediately dangerous to life, while this represents a complete occlusion, which must be overcome in order that the child may live. Such cases are extremely rare, and are among the easiest to remedy. In these the anus is simply closed by a thin membranous diaphragm resembling very much the hymen, which is composed of fibrous or mucocutaneous tissue, very thin and flexible, that extends in crescentic layers from one wall of the anus to the other. If the rectum is properly devel-

oped in these cases one can easily see or feel the bulging of the meconium against this thin diaphanous membrane.

It has been assumed that this form of malformation is simply an arrest in the absorption of the membrane dividing the proctodæum and the enteron. Its location in some cases is too low down to justify any such general conclusion. The measurement laid down by Trelat, and again by Bodenhamer, gives the length of the anus as $1\frac{1}{2}$ centimeter ($\frac{5}{8}$ of an inch) at the time of birth. Now, if this diaphragm were the unabsorbed membrane between these two portions of the intestine, it would be located at the level at which the partition is found. Writers who have described these cases speak of them as being found at $\frac{1}{2}$ a centimeter, $\frac{3}{4}$ of a centimeter, and at 1 centimeter from the anal margin. The author has seen three such cases. In one the membrane was situated just $\frac{1}{2}$ a centimeter ($\frac{3}{8}$ of an inch) from the margin of the anus; in another it was situated a little less than 1 centimeter ($\frac{3}{8}$ of an inch); and in the third at almost exactly 1 centimeter. They were all covered below with a muco-cutaneous membrane. The membrane in one case was so thin that it was punctured with the flat end of an ordinary probe, and then divulsed by the fingers. Four years afterward this child was seen, and there was no evidence of the remains of the membrane, but the sagittal line of the pecten was clearly marked and well above the point at which the membrane was attached, judging by measurement. In the other two cases later observations were not obtainable. One should not infer from this that occlusions from arrest in absorption of the septum between the proctodæum and enteron do not occur, for they do; but they are not the only membranous occlusions of the anus. Later on we will see that in some cases the anus is occluded by one and the rectum by another separate and distinct membrane.

Diagnosis.—The diagnosis of these cases is based upon the absence of discharges of meconium, inability to introduce the finger into the rectum, the obstruction being low down, and the thin fluctuating feel of the occluding membrane.

e. Anal Opening at some Abnormal Point in the Perinæum or Sacral Region.

This variety of malformation is described ordinarily as a malformation of the rectum itself, and in some instances it is such, for we have cases in which the anus is more or less developed in its proper site, and yet the rectum opens at some other point of the perineal or sacral region. In the majority of cases, however, where the rectum opens at one of these abnormal positions there is no other anus present, and a careful examination of the abnormal opening will show that there is a more or less developed sphincter around the aperture. Where such a sphincter exists, it seems quite natural to call this opening the anus, especially

if we can show that the pavement epithelium which covers the skin and lines the lower portion of the intestinal canal extends for any distance upward in the abnormal opening. Where this pavement epithelium ceases abruptly upon the edge, and is transformed into columnar epithelium, without evidence of the gradual transition between the two seen in the normal anus and rectum, then we may properly classify them under malformations of the rectum.

There is no fixed position, nor even a general one in which such openings may be found; in fact, sometimes there is more than one orifice. The openings may be in the anterior or posterior part of the perinaeum

(Fig. 38), to one side or the other of the sacrum, or outside of the gluteal fold. Indeed, the rectum or the small intestine has been known to open on the thigh, the abdomen, and the shoulder. The anus is usually developed in the normal site in the latter cases.



FIG. 38.—ANUS OPENING AT TIP OF COCCYX.

It is not intended to classify under this head those cases in which the rectum opens at such remote points, or into other organs. We refer here to those in which the anus opens at an abnormal position in the perinaeum or sacral region. They have been described by some as fistulous openings, but they have none of the pathological characteristics of fistula. There is no pus associated with them, there is no cicatricial contraction at the time of birth, and there is every evidence that the folding in of the epiblast simply occurred at an abnormal position.

Diagnosis.—The diagnosis of such cases consists simply in seeing

them. It is important, however, to determine whether there is sphincteric control over the passages. If there is, interference will not be justified; but if there is not, it should be undertaken as soon as the child's condition will admit of it with safety.

MALFORMATIONS OF THE RECTUM

a. Entire Absence of the Rectum.

This variety of malformation is one which it is impossible to diagnose without exploratory incision. The condition of the external parts in no wise indicates the probable absence of the rectum. In those cases in which the imperforate anus is well formed the rectum may be close at hand, hanging loosely in the pelvic cavity, attached to some other portion of the abdominal wall, or it may be entirely absent (Fig. 39). In cases where there is no external evidence of an anus or rectum, the latter may be closely attached to the perineal skin. No defects of surface conformation are sufficient to predicate the entire absence of the rectum. Bodenhamer and Verneuil have suggested the use of the stethoscope applied to the perineal region to determine the existence of gas in imperforate anus.



FIG. 39.—COMPLETE ABSENCE OF THE RECTUM, THE COLON ENDING IN A LARGE DILATATION AND THE ANUS BEING NORMAL.

The information obtained from this is so far from reliable that one can only call it a negative process. The absence of the rectum can be determined only by a search through both the perineal and abdominal routes.

The entire absence of the large intestine forms one variety of mal-

formation in the revised classification of Pappendorf and Bodenhamer. In such cases the small intestine opens at some abnormal position, as,



FIG. 40.—CASE IN WHICH THE RECTUM FAILED TO REACH THE ANUS.

for example, the shoulder, the neck, the chest, the œsophagus, the stomach, or, as in some instances, through the umbilicus. Such cases, however, are beyond the domain of rectal surgery only in so far that if the child should reach the age at which it would bear surgical interference well, an artificial anus, either in the perinæum or at some convenient position of the abdominal wall, might be made to take the place of these abnormal openings.

b. The Rectum arrested in its Descent more or less removed from the Anus, the Anus being Normal.

In this variety of malformation the enteron is either arrested in development and fails to come in apposition with the proctodæum (Fig. 40), or it may pass downward in the wrong direction and parallel with the *cul-de-sac* of the proctodæum (Fig. 41). The distance at which the rectum is arrested above the anus is very variable. Sometimes it is only a few lines removed, while at others it is found entirely above the pelvic cavity. Again it may be apparently in apposition with the anal *cul-de-sac*, and yet, when the membrane dividing the two is incised, no meconium will appear. In such cases there exist multiple obstructions. Friedberg, quoted by Ball, mentions a case of this kind in which the walls of the intestine were found adhering to each other in two places, and Schenk records a similar case in



FIG. 41.—CASE IN WHICH THE RECTUM DESCENDED POSTERIOR TO THE ANAL CANAL.

which he states that the rectum was divided at two levels by annular, thin, membranous septa. Bodenhamer, Bushe, Curling, Mollière, and Matas all confirm these reports, and Voillemier records a case in which the rectum was divided into four distinct compartments by three septa. Occasionally there will be found a distinct fibrous cord that extends from the closed *cul-de-sac* of the anus to the undescended rectum (Fig. 42). When the rectum descends parallel with the anal *cul-de-sac*, and yet fails to come in apposition with it, the former generally assumes a position parallel with the coccyx and sacrum, while the latter passes upward alongside of the prostate gland or vagina. In these cases the peritoneal cavity may extend downward and backward between the two occluded ends and render it impossible to pass from one to the other without entering this cavity. In the interesting case described by Amussat (*Troisième mémoire*, Paris, 1843) not only did the two *culs-de-sac* fail to meet one another, but the anal *cul-de-sac* opened into the vagina (Fig. 43), while the rectal *cul-de-sac* ended a short distance from the skin just anterior to the coccyx.



FIG. 42.—FIBROUS CORD LEADING FROM THE ANUS TO THE ARRESTED RECTUM.

It has been claimed that these multiple septa and the fibrous cord leading from the anal *cul-de-sac* to the enteron are indicative of the gut having been patulous in foetal life and become occluded through inflammatory or pathological processes. No better answer to this theory can be given than that of Ball, who says:

“Unquestionably this cord is very frequently present, but it by no means follows that its presence presupposes a pervious intestine. On the contrary, its presence can be shown with much greater probability

to have developmental origin; the mesenteron which originates from the hypoblast, as before mentioned, forms the upper portion of the rectum, but from it the mucous membrane alone is developed, a layer of mesoblast subsequently surrounding the tube to form the muscular and



FIG. 43.—RECTUM DESCENDING POSTERIOR TO THE ANUS AND THE LATTER OPENING INTO THE VAGINA (Amussat).

other external portions of the intestinal wall; consequently, when the development of the *cul-de-sac* of mesenteron becomes, from any cause, arrested, it does not follow that the growth of the other tunics originating from the mesoblast should be arrested also; and when there is no mucous coat to be surrounded, it can be readily understood how this portion of mesoblast can form itself into the rounded cord. Again, we must remember how exceedingly rare it is for a mucous canal to be obliterated by inflammation, unless attended with a very considerable superficial loss of substance. The

only instance that I know of in which a mucous canal is obliterated during the process of development in the human subject is that of the urachus, but even in this case evidence of the mucous membrane, and even small mucous cavities, are still found in the cord which forms the remains of this fœtal structure. I have recently had an opportunity of carefully examining a case of this kind from a patient under Professor Bennett's care in Sir Patrick Dun's Hospital, in which, after failure to meet the rectum by perineal incision, a colotomy was performed, but the result was fatal. In this instance there was a very firm and strong cord extending from the *cul-de-sac* to the anal portion; a microscopical examination of this cord showed it to be composed entirely of muscular and connective tissue, without a trace

of mucous membrane. I was also able to determine another important point in this case. If the anal depression is composed alone of proctodæum, it is obvious that, as it originates entirely from the epiblastic layer of the embryo, it should have its surface covered with scaly and not columnar epithelium. I consequently obtained a small piece from the fundus of the anal depression, and made sections of it. There was not a trace of glandular epithelium to be seen in it, so that, in this case at any rate, the conclusion was unavoidable that the malformation was due to the fact that the mesenteron did not descend low enough for the proctodæum to meet it; and that, I believe, is the explanation of the majority, if not all of these cases."

In addition to this it should be remarked that there is no other evidence of previous inflammation in the intestinal canals of such children.

Diagnosis.—The diagnosis of these cases is not made frequently until some days after birth. The normal appearance of the anus does not suggest the necessity of digital examination, and it is not until subjective symptoms, such as meteorism, nausea, and fecal vomiting, begin that the real condition of affairs is recognized. The anal *cul-de-sac* under such circumstances measures from 1 to $1\frac{1}{2}$ centimeter ($\frac{3}{8}$ to $\frac{5}{8}$ of an inch) in depth, and frequently less. The finger is arrested at once upon attempts to introduce it into the rectum.

If the enteron is close down to the *cul-de-sac* of the anus, with the finger in the latter, when the child cries or its abdomen is pressed upon, an impulse can be felt. If, however, it is at some considerable distance, or if it descends alongside of the anal canal, such an impulse will be absent. It is impossible to tell accurately by any method the distance at which the rectum will be found from the anal *cul-de-sac*, and the fact that the peritoneal cavity may intervene between the two renders the introduction of trocars or aspirating needles for diagnosis very dangerous. The only method to determine the distance is by actual dissection, and this should be done immediately upon recognition of the condition of affairs.

c. Rectum opening into some Other Viscus, the Anus being Present in its Normal Position, or Absent.

This variety is by far the most frequent of all malformations of the rectum and anus. It comprises about 50 per cent of all the cases, and the large majority of them are of the vulvo-vaginal type.

Leichtenstern (Ziemssen's Encyclopædia, vol. vii, p. 485) says that in 375 cases of rectal malformation, 40 per cent were of this variety; Bodenhamer says that 85 out of 287 cases belonged to this class. When it is recalled how completely the anterior is shut off from the posterior part of the perinæum by the perineal fasciæ, it is difficult to understand how this malformation can occur so frequently in male subjects; on the other hand, when the fact is recalled that the rectum and genito-urinary

apparatus are at first comprised in one general cloaca, the malformation seems likely enough. The division of the parts not having been perfect, some small communication is left, and through this the secretions of the intestine escape, keep it patulous, and at the same time prevent that weight in the intestine itself which would naturally cause it to sink downward and come in contact with the ascending *cul-de-sac* of the proctodæum.

The various types of these malformations are designated according to the organ with which the rectum communicates, as follows:

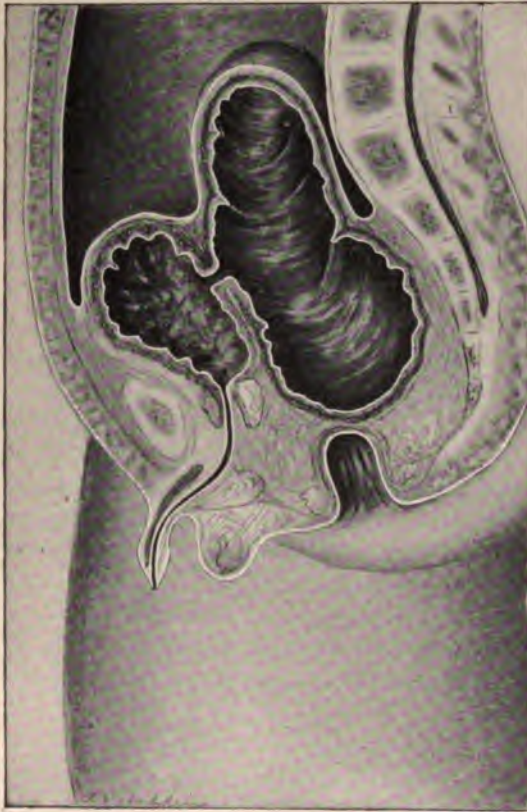


FIG. 44.—ATRESIA ANI VESICALIS.

Atresia ani vesicalis: Where the rectum opens into the bladder.

Atresia ani urethralis: Where the rectum opens into the urethra.

Atresia ani vaginalis: Where the rectum opens into the vagina.

Atresia ani uterina: Where the rectum opens into the uterus.

Atresia Ani Vesicalis.—When the rectum communicates with the bladder, whether in the male or female, it is usually by a very narrow canal lined throughout with mucous membrane (Fig. 44). In females this communication very rarely takes place. In males, however, it is not so rare. The

opening is likely to be at the trigone or higher up in the fundus. Where the opening is down below between the orifices of the ureters, the communication is generally but an elongated, narrow canal, running diagonally or obliquely through the walls of the bladder, and furnishing only a very restricted outlet for the contents of the enteron. Where the opening is in the fundus of the bladder it is usually

wider, and there is an exit for the intestinal contents. There have been no cases reported where these openings have involved the ureters or their exits.

Diagnosis.—The diagnosis of these cases will vary in difficulty according to the time when the child is seen. Usually it is simple enough; the absence of any passages from the anus will suggest an examination, and imperforation will thus be determined.

The appearance of the dark greenish stain of meconium in the urine is sufficiently characteristic to indicate communication between the rectum and urinary tract. The amount of this matter seen in the urine will indicate to a greater or less degree the size of the opening into the bladder. Sometimes the quantity is so small as to barely stain the urine, and sometimes it is so abundant that the urine may appear to be pure meconium. In the latter class of cases it will require close watching to determine whether the opening is in the bladder itself or in the urethra.

Ball says, "The fact that the meconium is intimately mixed with the urine, and it only appears during urination, would at once distinguish this variety from atresia ani urethralis." This is very logical and clear if we could observe the child during the urinary passage, but, unfortunately, this act generally takes place during the absence of the physician, while the child is asleep, or at such times as it is almost impossible to observe it, and consequently we have to draw our conclusions from the staining of the diapers and clothing. Constant oozing of meconium from the urethra would indicate that the opening was not in the bladder, but it does not prove it. The rapidly fatal course of such cases renders dilatory proceedings in the diagnosis of this condition very dangerous. Unless the condition is rapidly relieved, and the contents of the bowels are turned away from the bladder, cystitis will result, with subsequent infection of the ureters and kidneys, and the child will die. On the other hand, if the opening be small, as it usually is when the lower portion of the bladder is invaded, the child will likely succumb to the obstruction of the intestine. The prognosis in such cases is uniformly bad. The operation necessary to alter the condition is of such magnitude that most children are unable to stand the shock; on the other hand, delay subjects the victims to the double risk of intestinal obstruction and septic infection of the bladder and genito-urinary organs.

Atresia Ani Urethralis.—In a certain number of cases the rectum opens into the urethra (Fig. 45). This condition may occur in the male or female, but it is much more frequent in the male. The opening may occur at any point along the whole tract of the urethra, but in the majority of cases it occurs in the membranous portion. The communication is generally by a long, narrow, tubelike channel, passing from the un-

descended rectum down in front of the perineal fascia, and opening into the posterior surface of the urethra. This condition is not so serious as the preceding. Rowan reports a case in which the child defecated through the penis for two months without causing any signs of inflammation.

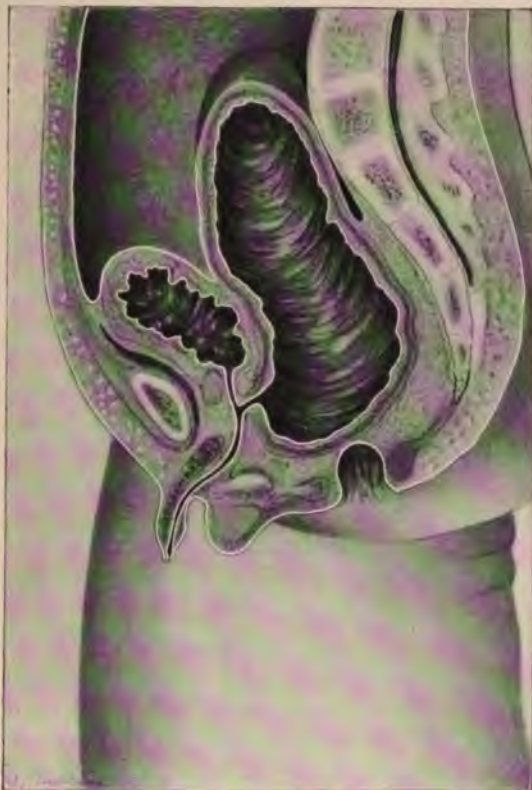


FIG. 45.—ATRESIA ANI URETHRALIS.

Bodenhamer cites a number of cases in which the victims have lived to the age of twenty-one and thirty years respectively, always defecating through the urethra. The opening may also occur at the prepuce or frenum, as in the case of Coley (Fig. 46).
Diagnosis. — The diagnosis of this condition is somewhat more simple than that of atresia ani vesicalis. The meconium or faecal matter passes, either constantly or at stated periods, unmixed with urine, and independent of the urinary act. The intestinal contents may be found escaping from the meatus at any time, and no evidence of cystitis or nephritis seems to develop. If the communication between the rectum and urethra be very small, as it generally is, the patient may suffer from obstruction and distention of the bowels and all the consequent complications; but if the opening be fairly large there may be no subjective symptoms whatever and no indication for immediate action. Under such circumstances it can be easily understood that the prognosis in such cases is much more favorable than in the preceding class. Moreover, the fact that the rectum is usually low down in the perinaeum in these cases makes the probable outcome of an operation to restore the anus to its normal position much more encouraging.

Atresia Ani Vaginalis.—This variety furnishes about 50 per cent of

all the cases of malformation of the rectum. The frequency with which it occurs will never be known, inasmuch as it produces so little subjective inconvenience that patients go through life, perform all their duties, marry, bear children, conduct their households, and yet do not know that any deformity exists.

Buckmaster reports a case of a woman thirty-two years of age whose rectum opened into the vagina near the vulva, and who never knew that she was deformed until examination for a uterine complaint revealed the condition. The author observed in the Philadelphia Hospital a prostitute whose rectum opened by a sort of valvular orifice into the vagina, and who had lived to the age of twenty-eight years without knowing she was in any way deformed (Fig. 47). The communication be-



FIG. 46.—ATRESIA ANI PREPUTIALIS.

tween the rectum and the vagina in this variety of malformations may be located at any portion of the vaginal tract, from the posterior *cul-de-sac* down to the very margin of the vulva. It may also be between the anus and vagina, thus involving practically neither organ.

The opening may be very small, but it is generally of sufficient proportions to allow the free and regular escape of meconium and also of fecal matter, unless the latter becomes very hard. The opening may be in the center of the lower end of the rectum, or upon the side, in which case the organ usually ends in a large, dilated *cul-de-sac*. Sometimes the opening is by a somewhat elongated, tubular canal, and in these cases the passage of fecal matter will be obstructed as soon as the condition of the bowels becomes the least solid.

Ball reports a case of a woman, the mother of six children, who had this form of malformation all her life without the slightest inconvenience. He says: "The anus opened into the lower portion of the vagina, and was so far provided with a sphincter that when the tip of the



FIG. 47.—ATRESIA ANI VAGINALIS.

finger was introduced into the rectum it was tightly grasped. There was not the least incontinence, and the bowels acted regularly every day." Ricord and Modlin have reported similar cases.

Buckmaster has collected 27 cases of this malformation, the ages running all the way from six months to forty years. He includes also in this collection Morgagni's case at one hundred years of age.

Caradec (*Gazette d'hôpitaux*, 1863) has reported the case of a woman, thirty-two years of age, in whom the anus and vagina were normal, except that from the margin

of the vulva, between the orifices, there was an opening, slightly oval and large enough to admit two fingers, with its longest diameter antero-posterior. This opening led into a *cul-de-sac* lined with mucous membrane, which at its entrance offered a certain resistance like that of the sphincter. The anterior wall between it and the vagina was thicker above than below. The posterior wall, on the contrary, was thicker below, and presented a fistulous opening large enough to admit the tip of the finger at about 5 centimeters (2 inches) above the anus. The woman suffered no inconvenience until after marriage, when fecal matter began to pass by this median opening. Caradec termed this malformation a second vagina, but it appears that it would have been more appropriately termed a second anus.

In this variety of malformation the anus may be perfectly formed, or it may be entirely absent. In some cases there is an opening into the vagina as well as a perfectly formed connection between the anus and rectum. In these cases the openings into the vagina may never be suspected during virginity. I have heard of one case in which it was claimed that the passage of fæcal matter through the vagina was due to traumatism during the sexual act. Closer examination proved that there was, and had always been, a sort of valvular communication between the vagina and rectum, lined throughout by mucous membrane, and that the passage of fæcal matter through the vagina had only been prevented by the existence of a close hymen.

Out of 36 cases of malformations not included in the statistics so far collected by others the author finds 18 cases of this variety. The openings into the vagina are usually large enough to admit of the passage of ordinarily formed fæcal masses, they cause little inconvenience in early life especially, and happily do not demand any immediate operative interference. The child will grow and thrive, and if the opening is not large enough to admit of the passage of fæcal masses, it can be dilated to a sufficient extent to serve all practical purposes, until the child attains an age at which surgical operations can be safely performed. The prognosis, therefore, in such cases is always good. There is no excuse, however, for the malformation being overlooked, and the child allowed to reach the age of puberty or even older years with such a deformity. These cases emphasize the necessity of examining the rectum at birth. They are practically harmless if recognized and treated properly, but if neglected, they may be discovered at a time when such a deformity would wreck the life of the woman.

Atresia Ani Uterinæ.—Communication between the uterus and rectum is of the rarest occurrence. Only two cases of this condition have been reported. The opening in one of these cases was in the posterior lip of the cervix, in the other the site was not mentioned. No case has been reported in which the intestine communicated with the fundus of the uterus. The tracts of communication in the cases reported have been small and contracted, only allowing a feeble escape of meconium through the vaginal orifice. In each case the gut had been supposed to open into the vagina, but upon dissecting the rectum away it was found to enter the uterus itself. Such cases are too rare to merit any lengthy discussion. They are simply instances of the freaks of nature which are seen and exhibited as monstrosities in museums or pathological laboratories.

d. Where the Rectum and Anus are Normal, but have opening into them Other Organs, such as the Ureters, Vagina, or Uterus.

Numerous cases of this form of malformation have been reported.

Bodenhamer has collected 7 cases in which the ureters opened into the rectum at the peritoneal reflection, and 9 cases in which the vagina terminated in the rectum. The author has seen 1 case in which the vagina opened into the rectum at about 1 inch above the anal orifice. The uterus in this case opened between two little pillars or rudimentary vulvæ. There was absolutely no vaginal formation upon the external surface. The two little pillars came together and formed a median rhapshe which ran backward to the rectum. The uterus could be easily felt through the opening into the vagina from the rectum, and there was no *cul-de-sac* in the vagina below this opening. The woman suffered no inconvenience whatever from the malformation, and declined to have any operation done to remedy it. Most of these cases occur in females, and the diagnosis is not made until puberty. In the case which the author saw, the malformation was discovered through ineffectual attempts at sexual intercourse. When opportunity for examination is afforded there is no difficulty in diagnosing such malformations.

Treatment.—While the method of operation in malformations of the anus is of great moment, the time at which it should be done is of paramount importance. When there is complete atresia, what is to be accomplished must be done at once in order to afford the child any chances of life. On the other hand, in those cases in which there is an exit for the meconium and fluid fæces, a more conservative course may be adopted until the child has grown to such an age that its strength will admit of whatever surgical manipulation may be necessary. If the exit for the meconium be very small, but within reach, it may be gently dilated, even though it be in bad position, until the child's age will justify radical surgical interference.

When we realize how much at times depends upon the life of a single infant, how absolutely lives may depend upon the altering of such a deformity as this, and how dear the life of every child is to its mother, we can comprehend how necessary it is for every physician to be prepared to act—act promptly and wisely in such an emergency. The prime object in all operations for malformations of the anus and rectum is to give an exit to the intestinal contents. Such an exit should be made convenient, permanent, and effective, if it can be done without jeopardizing the child's life. We must therefore consider first in what position the outlet can be placed with the greatest safety to the child. After this our efforts should be directed toward obtaining all the functional activity of the normal organ; therefore, if possible, the opening should be made at the proper time in the normal site and as far as possible surrounded by the normal muscles and tissues.

Operations for imperforate anus are comparatively modern. The Greeks and Romans seem to have looked upon this malformation as

beyond the surgical art. The first instances given of an operation for this condition is that of Egineta (Marius Durand, *Gaz. des hôpitaux*, Paris, December 1, 1894, p. 1301), who in the seventh century relieved an imperforate anus by incising the *sæptum*. This method was the one generally adopted from that time on, the incision being dilated by wax bougies or by the finger. It is remarkable that at this early period the line of scientific surgical technique should have been so clearly foretold. The description given by Durand does not indicate any blind plunging with the knife, but a careful incision into a bulging sac. The operator knew and saw what he was incising, and this is the whole secret of the modern operation.

Later on the use of the trocar as an instrument for searching after the rectal pouch was introduced, and for a long time the method of incision was little used. Children falling into the hands of general practitioners were subjected to the trocar operation, and most of them were left to die if this method failed. In 1834, Breschat reported he had obtained twelve successful results by the method of perineal incision. This popularized the method in France. In 1787, Sir Benjamin Bell, says Bodenhamer, advocated a dissection through the perinæum, dilating the wound by the use of his finger, and searching for the rectal ampulla in the hollow of the sacrum with the trocar, if it were not found lower down. Shortly after this Dr. John Campbell, quoted also by Bodenhamer, successfully performed this operation in Flemingsburg, Ky. This was the first successful operation for imperforate rectum in the United States. Hutchinson advocated dissection for $1\frac{1}{2}$ to 2 inches, and after this trusted to the trocar only. Dieffenbach made a crucial incision in the perinæum, excised the triangular flaps, carried his dissection to the height of 1 inch, and then substituted the trocar for the knife to penetrate upward and backward into the hollow of the sacrum until the rectal pouch was tapped, when the path of the trocar was dilated and the meconium allowed to escape. "If this procedure failed, the cannula was allowed to remain *in situ*, and a piece of sponge was forced through it and left to dilate the space beyond. If after this dilatation the pouch could not be reached, colotomy was performed" (Matas, *Surgical Treatment of Imperforate Anus*, p. 7).

For a long time no attention whatever was paid to the preservation of the anus, nor was any attempt made to do anything more than to give the contents of the bowel a free outlet through the incisions made. The question of retraction and closure of the incisions was first brought up and discussed by Dionis (Bodenhamer) in 1740, and afterward by Malyn in 1840, who both maintained that the retraction of the perineal muscles would efficiently prevent the recontraction of the wound. This assertion has not been confirmed by surgical experience.

Rouz (*Gaz. des hôpitaux*, 1851, vol. vi, p. 434) first laid special stress upon the importance of preserving the sphincter fibers while dissecting the perinæum. He made a clean surgical dissection by the use of the knife, preserving as far as possible whatever rudimentary developments of the external sphincter existed in the perinæum. He still followed, however, the faulty technique of allowing the meconium to escape through the open perineal wound regardless of its depth, thus exposed the child to infection, and if the peritonæum had been opened, allowed the contents of the intestine to extravasate into this cavity.

In 1835, that great and original thinker, Amussat, published in the *Gazette de Paris* an article entitled "The History of Operation for Artificial Anus, Practised with Success by a New Procedure in a Case of Congenital Absence of the Anus, with Some Reflections upon the Obliteration of the Rectum." From this operation and report begins the scientific and radical treatment of malformations of the anus and rectum. In this paper also was first thrown out the suggestion that room for operative procedures about the rectum and pelvis might be obtained by the removal of the coccyx, thus for the first time pointing out the possibility of the sacral or Kraske operation and all its modifications.

It seems that the French and Germans have utterly forgotten the suggestion of Amussat in all their writings on, and developments of, the sacral route. Verneuil, writing in 1873, stated that the possibility and usefulness of resection of the coccyx had occurred to him as far back as 1853, but he had not put it into practise, owing to want of opportunity, until 1870. In this valuable paper, so often referred to, we can recognize the suggestion of Amussat, who was, no doubt, original in his work and thought, if not the pioneer in this line. The chief feature, however, of Amussat's recommendation was not the removal of the coccyx to gain space for operation; it was the fact that he dissected the rectum loose and brought it down, suturing the mucous membrane of the gut to the skin at the margin of the anus, if an anus existed, or at the nearest point to the normal position of the latter to which he could bring the undescended rectum. This furnished an exit to the intestinal contents upon the outside, which was sealed off from the wound by a close apposition of the parts. He advocated that the rectum should be freely detached from all its surroundings so as to bring it down to its normal position, if possible, without any tension; and that it should be drawn out of the wound and emptied of its meconium before suturing. He advised the free and wide dissection of the perinæum, as well as the removal of the coccyx, if necessary, to accomplish this. He also advised, where it was requisite, to

open the peritonæum, as this could be done with as little danger through the pelvic route as through the abdominal. From his day to the present time all methods of operation upon imperforate ani and malformations of the rectum have been based upon these propositions of Amussat, and barring the introduction of aseptic surgery, there has been no radical improvement in the method which he proposed. It is said by some authors that Amussat's proposition to remove the coccyx was not to gain space, but in order to afford a position higher up and nearer the undescended rectum, to which the latter could be attached in case of difficulty in bringing it down to the normal anus.

What he says is: "After having resected the coccyx, *in order to gain more room for reaching the rectum*, the space thus left will afford a convenient position to attach the latter in case it can not be brought down to the normal position." To those interested in the development of modern technique for operations upon malformations of the rectum and anus, the reading of Goyraud's articles published in 1856 (*Gaz. méd. de Paris*, pp. 509, 524, 538, 601, and 639), and Matas's brochure, 1897, is suggested.

A discussion of treatment under the individual types of malformation has been avoided for the reason that such discussion would necessitate numerous repetitions with regard to technique. We shall therefore consider the treatment in general, and point out its application to each particular form of malformation mentioned in the text. In the first place, then, let us study those malformations of the anus and rectum in which there is absolute occlusion. In such cases it is necessary that immediate and radical operative interference should be undertaken. The policy of waiting for a day or two to see if spontaneous opening will not occur, or with the view of allowing the child to gain strength, is most fallacious. Where there is no aperture at the time of birth there is little or no probability that it will show itself afterward. The child at birth is quite as able to withstand surgical shock as it is two or three days later after suffering from intestinal obstruction. Statistics of the operations performed within the first twenty-four hours show a decided advantage over those done at later periods. In general, we may say the earlier the operation in all cases of complete occlusion, the more favorable will be the prognosis. Every hour's delay, therefore, is a waste of valuable time. The complete absence of the anus is no indication whatever of the distance at which the rectum will be found; indeed, its distance is generally in inverse proportion to the development of the anus. Therefore, the amount of malformation found in the anus, or its entire absence, will not indicate in any manner the difficulty of the operation.

The prognosis in a case depends largely upon the facility with which

the rectum is found and brought into position, but this can not be stated with any certainty except after operation. It is the duty of the surgeon to explain clearly to the family that life is impossible without such an operation, and that no possible advantage can accrue from delay. The operation itself should be undertaken with the greatest aseptic precautions. No anæsthetic should be given to children of this age. They bear pain well, and the danger of shock from this is less than that of local or general anæsthesia.

Before beginning the incision, it is well to use every method at our command to determine if possible the position of the rectum. The skin at the normal position of the anus, or at some portion of the perinæum, may be of a greenish tinge, due to the transmission of the green color of the contained meconium through the attenuated tissue. There may be bulging at some point in the perinæum, indicating the near approach of the rectum. With a hand upon the perinæum and pressure on the abdomen, one may sometimes feel an impulse from the rectal pouch when the child is caused to cry or strain; percussion, while the stethoscope is applied to the perinæum, may also aid us to determine the proximity and site of the rectum.

Other methods, such as introducing a sound into the vagina, the bladder, or the urethra, have been advised; but the consensus of opinion, among those who have seen the most of this sort of surgery, is that they are without any material benefit. Finally, and that which has been the most frequently used and advised, the introduction of an aspirating needle, or a trocar, into the perinæum, and backward into the hollow of the sacrum, may be used to determine the position of the rectum. So far as this operation is concerned, exploratory needles are dangerous instruments. In their introduction through the perinæum into the rectal pouch, even if the latter can be found, one can never be assured that they do not pass through a diverticulum of the peritoneal cavity, and upon being withdrawn will allow the meconium to escape into this cavity, exposing the child to all the dangers of septic peritonitis. The aspirating needle is slightly less dangerous than the trocar. A fine one may be introduced into a bulging point, or at a place where impulse can be felt, and meconium withdrawn; then, without withdrawing it, one may dissect down along its track and open the gut. Unfortunately, however, the tension in all these blind rectal pouches is so great that even the sticking of a needle into them may cause rupture and extravasation of meconium into the peritonæum or track of the aspirating needle. Beyond these cases, in which the bulging or impulse are perceptible, no search with the trocar or aspirating needle should ever be made; and, indeed, in these very cases, the advantages are altogether with the plan of careful, patient dissection.

After having determined as far as possible the position of the rectal pouch, the operation can be undertaken at once. In cases in which there is no anus, one should endeavor to make one. A straight incision should be made from the point at which the anterior margin of the anus would naturally appear (Fig. 4), back through the skin and subcutaneous tissues to the tip of the coccyx. If there be a rudimentary anus the incision should begin at its posterior margin. Having cut through the skin and subcutaneous tissue, we come down upon the external sphincter muscle, or the fibrous band which takes its place when absent. In the majority of cases in which the anus is altogether absent, the sphincter is absent also. At any rate, whether fibrous or muscular tissues exist at this point they should be divided by a blunt periosteal elevator instead of by incision, and pulled gently apart. After this the dissection can be carried upward as far as is necessary in search for the undescended rectum. This median incision should be invariable; whether the impulse from the rectum is felt to one side, anterior or posterior to the anus, the incision and the division of the sphincter should always be the same. The dissection in searching for the rectum should be carried upward and backward in the hollow of the sacrum in order to avoid wounding the bladder or other pelvic organs. When the rectum has been found, an effort should be made to loosen the pouch from all its attachments, and bring it out through the opening which has been made, with a view of preserving the functional activity of the anus. This should be done, if possible, without opening the pouch. Sometimes, however, it will be found impossible to bring it down into the wound until its distention has been reduced. Just here we have the one useful indication for the trocar. When the gut has been freed from its attachments, and it is found insufficiently long to be brought down into the wound, the trocar may be inserted and the meconium drawn off entirely outside of the wound, thus reducing the distention and lengthening the gut. After this it will generally be found that the latter can be brought down into the wound without difficulty. Sterilized gauze should be packed around the trocar and well into the wound during this process, and the gut held firmly by pressure forceps. It is a better plan, however, if the gut can be brought outside of the wound, to do so, and having packed the edges of the wound with gauze, incise it as freely as necessary to afford an exit for the contained meconium.

The suggestion of Matas that a running stream of saline or other aseptic solution be carried over the parts during this process of emptying the rectal pouch seems to be contrary to the opinion of most surgeons. It is better to use simple, dry sponges, thus keeping the parts free from the discharge.

Having emptied the rectal pouch of its contents, the next step in the operation is to fix it in its normal site if possible. This is done by suturing the mucous membrane to the cut edges of the skin at the site of the normal anus. It is necessary to emphasize here that the sutures are not placed in the peritoneal or muscular walls, but in the mucous membrane of the gut. The intention is to seal off the perineal wound from contact with the faecal discharges, to bring the inner layer of the gut upon the outer surface of the skin so that the alvine discharge will be carried entirely outside of the wound. If there be superfluous mucous membrane, acting somewhat as a prolapse of the rectum, it would be all the better, so far as this intent is concerned.

Vincent has advised that when the anus must be made at some other than the normal position, it would be well to dissect two elliptical flaps of skin from either side of the wound and carry the mucous membrane outward over the edges of the wound, uniting it to the skin at the points from which these flaps have been dissected, thus affording a larger area of denuded tissue for the attachment of the gut, and at the same time carrying the discharge from the intestinal canal more thoroughly away from the deeper section of the wound. This is a most excellent suggestion. When the gut has been brought down and sewed in its normal position at the anus, the closing of the posterior part of the perineal wound should be made with sutures passed deep enough to take in the fibers of the external sphincter and hold them in position until reunited. Silkworm sutures or chromicized catgut are most suitable for this purpose. With regard to the sutures to be used in fastening the gut to the margin of the skin, authorities differ; a good size sterilized catgut is preferred: first, because it has less tendency to cut through the tender membranes than does any other form of suture; second, it does not have to be removed; and third, after it is introduced it swells and stops up the holes through which it passes more or less effectually until it has become practically absorbed. Silkworm gut and silver wire are stiff and too unpliant to bring the points into close apposition.

The author prefers a broken, continuous suture. By this is meant a continuous suture carried half-way around the rectum and tied, and then a second one carried around the other half. The advantage of this suture is that it more completely seals off the wound from the rectal discharges than do the interrupted sutures. Its being broken in two places gives the anus more opportunity for dilating, and prevents the suture acting as a purse-string to contract the orifice. Where there is any difficulty or tension necessary to bring the gut down to the margin of the anus, this may be relieved by passing an anchoring suture through the external wall of the gut or the mesorectum, if it

can be found, and out through the skin, tying it over a wad of gauze, and thus taking the traction off the sutures in the mucous membrane.

The dressings should be of soft absorbent gauze moistened with boric-acid solution, and held in place by a diaper. The abdomen should be incased in a snug roller-bandage to avoid straining.

Cases in which the Rectum is arrested High Up in the Pelvis.—The incision and methods of suturing the gut, when found, are applicable to all forms of imperforate anus. We come now to the study of those forms in which the rectum is removed, or arrested, in its descent at a greater or less distance from the *cul-de-sac* of the anus. In such cases the anus may be absent, or it may be perfectly developed, ending in a *cul-de-sac* about 1 to $1\frac{1}{2}$ centimeter (about $\frac{1}{2}$ inch) in depth. The method of dealing with this *cul-de-sac* will be described later, as we desire at this time to devote out attention to the undescended rectum.

In order to thoroughly comprehend the difficulties of searching for the rectal pouch, it is necessary to understand the space in which the operation must be performed. This space is outlined by the tuber ischii upon each side, the scrotum in front, and the coccyx behind. The distance in infants between the tuber ischii is normally about $1\frac{1}{2}$ to 2 centimeters ($\frac{5}{8}$ to $\frac{3}{4}$ of an inch), and does not differ materially in the sexes. That from the scrotum to the coccyx averages from 4 to $4\frac{1}{2}$ centimeters ($1\frac{9}{16}$ to $1\frac{3}{4}$ inch), and from the posterior commissure of the vagina to the coccyx in girls about 3 to 4 centimeters ($1\frac{3}{16}$ to $1\frac{9}{16}$ inch). The distance from the anus, when developed, to the tip of the coccyx would average about $1\frac{1}{2}$ centimeter ($\frac{5}{8}$ of an inch). With these measurements in view, we can understand that the operative field or space would be embraced in an elliptical figure with a maximum length of 4 centimeters ($1\frac{9}{16}$ inch) and a maximum breadth of 2 centimeters ($\frac{3}{4}$ of an inch). The depth of the pelvis, or rather the distance from the tip of the coccyx to the promontory of the sacrum, is about 6 centimeters ($2\frac{3}{8}$ inches). The distance from the perinaeum, at which the peritoneal *cul-de-sac* is found, varies considerably, but it may be stated that in general this pouch in females is about 2 centimeters ($\frac{3}{4}$ of an inch), and in males it is $2\frac{1}{2}$ to 3 centimeters (1 inch to $1\frac{3}{16}$ inch). It should be borne in mind that these are normal measurements, and that in cases of malformation of the anus and rectum there is also likely to be some malformation of the pelvic frame. This malformation generally takes the form of abnormal contraction, and the space for operative procedure is thus reduced. It is well to mention here also the fact, shown by Cripps, that where there is malformation of the anus and rectum there is likely to be some abnormal distribution of the peritoneal *cul-de-sac*. This may pass downward and backward almost to the skin near the tip of the coccyx,

thus separating the ends of the proctodæum and the enteron by a true peritoneal cavity (Fig. 48). Such an arrangement of the peritoneum would render it impossible to introduce an aspirating needle or trocar from the anus into the rectum without passing directly through it, and would necessitate the subsequent infection of that cavity when the



FIG. 48.—MALFORMATION IN WHICH THE PERITONEAL CUL-DE-SAC EXTENDS BETWEEN THE BLIND ENDS OF THE RECTUM AND ANUS.

instrument was withdrawn. As it is impossible to predicate such a condition or its absence before operation, one should absolutely limit the use of the trocar to carrying the fluid contents of the rectum beyond and outside of the wound, after the organ has been found, and it is impossible to bring it outside of the wound before emptying it. It can be readily seen from the measurements above given that space for operative manipulation is very limited, and with the bladder, uterus, and other pelvic organs in position, the operator will have to be very careful in working in so small a space lest he injure

them. The chief space of the pelvis thus left for operative manipulation is in the hollow of the sacrum, and in order to reach this, one has to dissect backward and upward around the point of the coccyx, working largely by feeling and not by sight.

The methods which have been devised to increase this space have been numerous and ingenious. The first was that of Amussat, which consisted in removal of the coccyx. This operation, simple in itself and very easy to perform in children, is objectionable because it takes away the normal attachment of the anal and rectal muscles; it also removes the

support to the lower end of the rectum, and thus invites prolapse and posterior rectocele. Carrying this operation one step farther, we have the various modifications of the Kraske or sacral operation. It is not necessary to describe them here, further than to say that whatever portion of the sacrum it is thought wise to remove can be done by a strong pair of scissors without the use of a chisel or bone-cutting instrument. The danger of injury to the nerves, shock, and the removal of rectal supports and muscular attachments are the objectionable features.

If one could say positively when he begins that the rectum was high up, and the space would have to be increased, there is no doubt but that the Rydygier operation, described in the chapter on excision of the rectum, would be a practical and safe procedure. Such a radical operation, however, would not be justified unless we had some absolute assurance that the rectum was high up in the pelvis.

A more conservative plan is that of Vincent, who takes advantage of the soft, cartilaginous condition of the bones at this period, and splits the coccyx and the lower part of the sacrum through their center with a large pair of scissors; then the edges of the wound are retracted and ample space for operative manipulation, and a good, free view of the whole pelvic cavity are afforded. After the rectum has been found and brought into its normal position, deep sutures are used to bring the bones and tissues together, and thus the pelvic frame is absolutely restored. This operation, as described by Matas, Vincent, and others, has proved entirely successful, and the ultimate results have been most satisfactory. Theoretically there is one objection to it, and that is in cases in which the rectum can not be brought down to its normal position, and must be attached to the upper end of the wound, it will necessarily bring the gut out between two flaps of bone. In such instances the bone flap or Kraske operation would be more satisfactory. Nevertheless, in the Vincent operation there would be little difficulty in peeling out the cartilaginous section of the sacrum or coccyx so as to make the flap soft upon one side in such an emergency, and the ultimate results would be the same as by the other methods. The space for operative manipulation having thus been materially enlarged, the succeeding steps of the operation will be in full view and comparatively simple. Dissection should be carried upward into the hollow of the sacrum to the depth of 5 or 6 centimeters (2 or 2½ inches). At the same time careful palpation should be made with the finger in the wound to elicit, if possible, any impulse from the child's crying or from pressure upon the abdomen by an assistant. Where such impulse is felt it arises from the rectal pouch or from some loop of sigmoid, and dissection should be made in this direction. At this stage of the operation it is best to introduce a sound into the bladder of

the male or the vagina of the female, in order to determine the exact location of these organs, and thus avoid wounding them. The fibrous cord which sometimes leads from the imperforate anus up to the rectal pouch (Fig. 42), when found, should always be kept in view and followed closely, as it is a certain guide to the rectal pouch. Where this cord does not exist we must depend upon careful dissection in order to find the gut. When it is not found in the hollow of the sacrum after having dissected upward for the space of 5 or 6 centimeters (2 or 2½ inches) from the margin of the anus, dissection in this line is no longer advisable; but the operator should carry his incision through the soft cellular tissues forward and upward, entering the peritoneal cavity at once, if the rectal pouch is not reached before doing so. The dangers in this operation are not from opening the peritoneal cavity, but from allowing the intestinal contents to escape into it. The author would not advise opening the peritoneal cavity unnecessarily under any conditions, and much less so in a feeble child; but the old dread of invading this cavity has caused the waste of much valuable time, and has been the cause of death in many cases. Therefore, when the rectal pouch has not been found, after a reasonable dissection in the hollow of the sacrum, the immediate and free opening of the peritonæum is advised. When this has been done the search for the rectal pouch is simple enough. If it is distended and tense, and in the pelvic cavity at all, it will be easily felt. It may be attached to the promontory of the sacrum off to one side of this bone, or it may be floating loose in the peritoneal cavity. In the latter instance it is generally easily brought down, and can be attached to some portion of the wound without much tension. When, however, it is attached to the promontory of the sacrum, or to its side high up, the process of bringing it down is much more difficult. The difficulty lies in the fact that the rectal pouch is covered over and bound down to the bone by a peritoneal fold which entirely envelops the lower end, and is really the cause of its non-descent.

The splitting of this peritoneal covering, and the enucleation of the rectal pouch so as to bring it down to the margin of the wound, has been attempted with some success. This, however, is a most difficult procedure, and the author questions very much if it would not be wiser to do an inguinal colotomy as soon as such a condition of affairs is found to exist, or, if possible, bring a loop of the sigmoid flexure down and attach it to some point of the perineal wound. When the rectum is found, the greatest care must be exercised to loosen its attachments and drag it down so as not to rupture the inferior mesenteric artery, and thus obliterate the blood supply to the parts. When it has been brought down in the perineal wound at the normal position of the anus,

or higher up, if necessary, the peritonæum should be closed by gauze packing before the gut is opened to allow the escape of the meconium. If the development of the rectal pouch is so short that it can not be brought outside of the peritoneal cavity, then this cavity should be closed, the perineal wound packed off, and inguinal colotomy done at once. Sometimes, where the rectum can not be found by perineal incision and dissection, and inguinal colotomy has been done, it will descend at a later period, and the operator will be able finally to approximate the anus and rectum at their normal positions.

The fixation of the rectum in this form of malformation is practically the same as that in simple imperforate anus. The mucous membrane should be sutured to the skin at the normal anus if possible, and if not possible, it should be sutured at the lowest point of the perineal wound to which it can be brought without too great tension.

An interesting case illustrative of the conditions just mentioned is reported by Kronlein (Berlin. klin. Woch., 1879, p. 126). He opened the peritoneal cavity after a dissection of 3 inches without finding the rectal pouch. The finger end introduced in the cavity failed to find the missing *cul-de-sac*, and he immediately attempted inguinal colotomy. Here again he met with a difficulty in the close attachment of the colon to the lumbar region, which absolutely prevented his bringing the colon up into the abdominal wound. He was therefore compelled to bring up and open the next and most distended loop of intestine. He does not state whether this was the small intestine, sigmoid, or transverse colon. Nevertheless the child recovered, and seven months later, "when the finger was introduced into the artificial anus," a resisting body was felt in the pelvis, which he supposed to be the distended rectum. The perineal incision was reopened, and he found that the distended rectal pouch had since the operation descended low enough into the pelvis to be brought down and sutured at the site of the normal anus. This case is quoted in illustration, first, of the wisdom of early incision into the peritoneal cavity; second, of the difficulty which may arise in inguinal colotomy in children; third, as illustrative of the fact that the rectal pouch may continue to grow and descend, and eventually reach a position from which it may be attached to the normal anus long after birth. In Kronlein's case the inguinal anus closed in three weeks after the rectal pouch was attached to the anus.

Treatment of the Anal Cul-de-sac.—We come now to consider the management of those cases in which the anus is fully developed and the rectum more or less removed or has descended alongside of the anal *cul-de-sac*, as illustrated in Fig. 41.

In these cases the external sphincters are normal and the anal *cul-de-sac*, for the space of 1 to $1\frac{1}{2}$ centimeter ($\frac{3}{8}$ to $\frac{5}{8}$ of an inch), is per-

fectly formed. The treatment of this *cul-de-sac* and the question of union between it and the rectum (when the latter has been found) has created considerable discussion. The operation of end-to-end union between the two *culs-de-sac* is a very difficult one to perform, and most uncertain in its results. Recent surgical opinion and the results of operations upon this class of cases have convinced me that it is best to dissect away the lining membrane of the anal *cul-de-sac* and bring the rectal mucous membrane down to the margin of the skin thus freshened and suture it there. The incision in such cases would depend upon whether the rectal pouch can be made out without dissection or not. In case this was possible, the incision through the anus should undoubtedly be made in the direction in which the rectal pouch is felt; but if the position of the rectal pouch can not be made out without dissection, then it should be made from the posterior margin of the anal *cul-de-sac* back to the coccyx, just as in the previous operations.

Matas, in a case in which the rectal pouch descended in front of the anal *cul-de-sac*, sutured the end of the rectal pouch to the perineal margin, left *in situ* the anal *cul-de-sac* and incised the septum between the two. He says: "The objection to lateral ano-proctorrhaphy (as we might distinguish the suture of the bowel to the rudimentary anus as practised in my case) is, that it leaves a larger anal orifice than is required, and that the interposition of new mucosa in the posterior segment will act as a wedge and will interfere with the perfect grasp of the sphincters." He therefore advises as a better procedure the total excision of the anal *cul-de-sac*, leaving the marginal anal mucosa intact, and suturing to this the mucous membrane of the rectal pouch. Aside from the difficulty of end-to-end suture of the rectal and anal pouches (the circumference of the rectal pouch being always much greater than that of the anal) there will be imperfect coaptation and danger of valvular stricture eventually succeeding.

Colotomy in Cases of Imperforate Anus.—Thus far we have only referred to the operation of colotomy as a last resort in cases where the rectum could not be found, or where it was impossible, owing to other complications, to establish the anus at its normal position. The operation, however, merits a closer consideration. Some surgeons hold that an inguinal anus should be made as a preliminary operation to perineal search for the undescended rectum in all cases in which the latter can not positively be felt through the anal *cul-de-sac* or perinæum. They hold that it is more certain and less fatal than proctoplasty, and that it does not interfere with the ultimate establishment of the anus at its proper site after the child has grown stronger. The arguments in favor of such a procedure are not without weight. The rapidity with which such an operation can be performed is urged in its favor, and

can not be ignored. The fact that the sigmoid flexure is sometimes difficult to find in children, or that it generally rests upon the right side instead of the left in early infancy, does not militate against it. To one familiar with these conditions it is not difficult, if the abdomen is open, to sweep the finger clear across the pelvis in these little ones and find the loop of intestine in which it is desirable to make the artificial anus. Again, it is urged that in this operation an opportunity will be afforded to search the sacral curvature and deeper pelvis, and thus accurately determine the absence or presence and the location of the undescended rectum. Moreover, it is claimed that the amount of traumatism and mutilation of the tissues necessary to perineal search for the rectal pouch will be greatly lessened by a preliminary colotomy, and that if, after the abdomen is opened, the operator discovers the rectal pouch within easy reach of the perinæum, the abdominal wound can be promptly closed and the perineal operation performed with much greater certainty, and with smaller incisions than where it is attempted *ab initio*. Furthermore, the advocates of preliminary colotomy claim that after the artificial inguinal anus is established and the patient has recovered from the same, it will be quite feasible to pass a blunt probe or sound through the lower segment of the gut into the rectal *cul-de-sac* and thus determine the exact location of this pouch. With the probe in this position one can dissect down upon it with comparative ease and establish the anus in its normal position at a time when the child is well able to withstand surgical interference. These advantages are undeniable, and should be given due consideration.

The arguments against such an operation have been based chiefly upon the danger of invading the peritoneal cavity, and the high mortality which has followed the operation. Since Lawson Tait has practically dissipated the fear of invading this cavity, and since it has been shown that under proper aseptic precautions and with due celerity the peritoneal cavity of a child can be opened almost as safely as in those of greater years, this argument has lost much of its weight. No one would controvert the proposition that if the faecal exit could be established at the normal site without invading the peritoneal cavity, or subjecting the child to too great and protracted surgical procedures, such a method would be preferable to inguinal colotomy. But when the child is extremely weak, when immediate relief is urgently demanded, and when the condition will not justify even the delay of a prolonged search for the rectal pouch, inguinal colotomy undoubtedly has its advantages.

Another argument against the performance of this operation in children is based upon the thin and fragile texture of the intestine

during infancy. It has been held, and justly so, that its tissues will not bear suturing well, that they are not strong enough to hold the gut firmly in the abdominal wound, and therefore there is great danger of their breaking loose and allowing the loop of the intestine to drop back into the abdominal cavity after it has once been opened, thus infecting the peritonæum and producing a fatal termination.

If it was necessary to depend upon sutures to hold the gut in position, these facts would be sufficient to condemn the operation, except as a *dernier ressort*. But this argument loses its force when we consider the fact that the best operators no longer use sutures to support the intestine in colotomy. Maydl and Reclus have established the fact that few if any sutures are necessary in the performance of this operation, and that a glass rod passed through the mesentery from one side to the other of the wound forms a safer, a more permanent, and better support to the intestine than any number of stitches can possibly do. Hundreds of operations done after this manner with perfect success have confirmed their opinions that the dangers of infection, tearing loose, and puncture from stitches and stitch-hole abscesses have been entirely obliterated by their method. Not only is this true, but the time of the operation has been greatly shortened and the dangers of surgical shock proportionately decreased. Thus, where circumstances seem to demand it, an inguinal colotomy may be safely and quickly made in children with imperforate ani, and by it valuable lives may be saved which would almost certainly be lost if any other method were adopted. The question of closure of the artificial inguinal anus will be discussed later on; but it may be stated here that in children such apertures will generally close spontaneously if a normal exit for the intestinal contents has been well established.

The choice of operations, therefore, between the perineal dissection in search of the rectal pouch and inguinal colotomy will depend first upon the knowledge which we have of the proximity of this pouch and the child's ability to withstand surgical operation. Where there is no evidence that the rectal pouch can be easily reached, and where the child is in an enfeebled condition, with distended abdomen, faecal vomiting, and nausea in progress, one should not hesitate to choose the abdominal route, perform an inguinal colotomy at once, and thus afford an immediate exit to the intestinal contents, and an escape for the gases which are causing the distention and the constitutional disturbances.

Proctoplasty Versus Colotomy.—The term proctoplasty has been adopted by recent writers to describe the various perineal methods for operations upon imperforate ani. There has been a long and animated discussion concerning the comparative mortality from proctoplasty and colotomy in these cases. Able and vigorous writers have been engaged

upon either side. Recently the wage of battle seems to favor the perineal method.

In the total number of operations done, there is no doubt that the percentage of fatalities is less in proctoplasty than in colotomy. It must not be forgotten, however, that a large number of the cases done by the former method have been of the simplest type, and have required operations of no magnitude. In many of these cases the rectal pouch has been in apposition with, or very close to, the perinæum, so that it could be reached by a very shallow incision and without involving any important organs. The list of these operations also includes many cases of malformation, such as atresia ani vaginalis, which would not have proved fatal had nothing been done for them. On the other hand, the cases in which primary colotomy has been performed have been those of the most desperate character, many of them having already undergone prolonged perineal search previous to the colotomy operation.

In studying the comparative figures, therefore, we must not attach too great importance to the percentage column. In the old statistics the operation of puncture by the trocar was always included, and a very high mortality resulted. Thus, Anders gives for it 50 per cent, Curling 76.4 per cent, and Cripps 82.3 per cent. This operation is now practically abandoned, and need not be considered here.

The following brief table represents the comparative results of colotomy and proctoplasty in the collections of cases by Anders, Curling, and Cripps:

Mortality from Different Operations for Imperforate Anus

	Anders.	Curling.	Cripps.	Author.
Colotomy, primary..	52.3 per ct.	47.6 per ct.	68.4 per ct.	43.7 per ct. (32 cases).
Colotomy, secondary —i. e., after proctoplasty had been attempted				45.2 per ct. (42 cases).
Proctoplasty	30.5 per ct.	39.3 per ct.	32.7 per ct.	
Proctoplasty, omitting atresia ani vaginalis	38.2 per ct.	.....	40.4 per ct.	39.3 per ct. (66 cases).
Total cases	67	100	.....	140

From the table one will see at a glance that the perineal method is less fatal than colotomy. We must not forget, however, the variations in gravity between the class of cases in which the one and the other operation is adopted.

In a study of the modern journal literature upon this subject, 140 cases in which operations have been done for malformations of the rectum have been collected. Of these, 66 cases were performed by the

perineal and sacral route with 26 deaths, a mortality of 39.3 per cent. In 42 cases colotomy was done secondary to perineal and sacral operations with 19 deaths, a mortality of 45.2 per cent. Thirty-two primary colotomies were done with 14 deaths, a mortality of 43.7 per cent. The introduction of these tables would consume too much space. But almost without exception primary colotomy was done in the most grave conditions. This is emphasized by the fact that the mortality in immediate colotomies is very slightly less than in those which were done secondary to extensive perineal operations. These facts are borne out by those of Matas (Transactions of the American Surgical Association, 1897). The high mortality given by Anders for colotomy in these cases is explained by the fact that in 21 operations done, 12 of the patients had previously been subjected to prolonged perineal operations, and thus their condition was not what it should have been in order to begin the colotomy. Moreover, the low mortality in his table for proctoplasty in general is made up from a number of exceedingly simple cases in which there were only membranous divisions between the rectum and anus, and others of atresia ani vaginalis. If these cases are left out of his tables the mortality from colotomies will be largely decreased, and that from proctoplasty will be considerably increased. But, after all allowances are made, proctoplasty, or the perineal operation, still has the advantage in a smaller mortality. Nevertheless, it is the condition of the child and the urgency of the case, and not the statistical mortality which should determine us to choose proctoplasty or colotomy in any individual instance. In exhausted children with tympanites and symptoms of intestinal sepsis, the most expeditious methods of relief are demanded, and, as Matas well says: "Under such adverse conditions it can not be denied that inguinal colotomy is the quickest and safest operation."

Treatment of Abnormal Narrowing of the Anus.—In cases of abnormal narrowing of the anus no operative procedure is called for in the early period of life, provided a reasonable exit exists for the fluid contents of the bowel. Gradual and gentle dilatation with bougies, or with an ordinary uterine dilator, will generally bring the parts up to a comparatively normal size. This conservative method of treatment will afford the necessary exit for faecal matter, and in this condition the child may wait until it has developed sufficient strength to stand surgical procedures. If the contraction should prove to be of a fibrous nature, which condition is exceedingly rare, posterior proctotomy, or, which is better still, the excision of the fibrous tube, bringing down of the mucous membrane and suturing it to the skin may be performed at a later date (Lannelongue, Bull. et mém. soc. de chir. de Paris, 1884, p. 200; Degouy's Thèses, Lyons, 1894; Couty, Thèses, Paris, 1889; and Vauclaire, Méd. infant, Paris, 1895, p. 86).

Treatment of Partial Occlusions.—When the obstruction consists of a fold or band of skin running from the scrotum or posterior commissure of the vulva back to the coccyx, there is no advantage in delay even though there be a moderate exit for the meconium. Such a band can be snipped off at its ends with scissors and dissected away. The anus should then be periodically dilated until it assumes its normal shape and size. When, however, this partial occlusion occurs at a higher level, and the exit for the meconium is very limited, the question as to management is somewhat more difficult.

Matas (*op. cit.*) states that simple incision of these crescentic diaphragms has not been satisfactory. The procedure, he says, is followed by recurring strictures and consequent obstruction to the faecal passages. He therefore advises the total excision of the membranes and suturing the edges of the wound together. Most authors, however, do not appear to have seen any such results from simple incision in these cases. In fact they state that if such membranous obstructions are thoroughly incised, they will atrophy and entirely disappear. The author's experience has been limited to 4 cases of this kind, and he has not been able to follow them to any late period of life; but two of them he has seen at the ages of four and six years respectively, and no such strictures had occurred. He is of the opinion that Matas's views are largely theoretical upon this point, and that inasmuch as the simple incision is almost entirely without danger and involves no shock it ought to be employed in all these cases. If a stricture should occur, it may be resected later on in life. The possibility of hæmorrhage in incising these obstructions should always be borne in mind. One case has been reported in which the child died from this cause.

Treatment of Complete Occlusion by a Membrane or Diaphragm.—These cases are among the simplest as well as the rarest of rectal malformations. Usually this membrane is so thin and diaphanous that the color of the meconium is transmitted through it, the bulging of the rectal pouch is easily felt when the child cries or when pressure is made on the abdomen, and there is little doubt about the close proximity of the pouch.

Sometimes these membranes are so thin and fragile that even examination with the finger, especially if the nail be sharp, will rupture them, and there will be a spurt of meconium from the anus. At other times, however, the membranes are more dense and fibrous, and while the impulse can be felt, ordinary pressure fails to rupture them. The impression to the touch in such cases is very similar to that produced by the bag of waters in the early stages of labor. In such simple cases a crucial incision through the membrane, carried from one side to the other of the anus, will be all that is necessary. The little tri-

angular folds left by such incision atrophy and disappear, and no remains of them can be seen in after life.

Unfortunately, however, there is sometimes more than one such membrane. When this is the case the fluid which escapes through the first incision is only a thick serum or mucus and not meconium. Great care must be exercised in determining the nature of this fluid, else in these cases the operation will be of no avail. The finger should be introduced well up into the rectal pouch after the incision is made, the parts well dilated, and the operator should assure himself that no secondary membrane exists at a higher level. Voillemier's case, in which there were three such distinct membranes, forcibly illustrates the necessity of such precaution. One point must be taken into consideration in these cases, and that is that the impulse imparted to the finger may be due to fluid in the peritoneal cavity. Incisions through such membranes should be made with the greatest aseptic precautions in order to prevent any disastrous results following. When a second membrane is found to exist, a tubular speculum should be inserted and the parts carefully observed to see that the cavity from which the first fluid escapes is lined with mucous membrane and is entirely shut off from the peritoneal cavity. Through this speculum, under aseptic precautions, a long aspirating needle may be introduced through the second membrane if fluctuation and impulse can be felt. If meconium is drawn through this needle, then, with the needle still in position, an incision may be made through the second membrane and the wound gently dilated.

At these higher levels wide crucial incisions are to be avoided, as they may accidentally involve the peritoneal cavity. The making of an exit sufficient for functional purposes is as much as can be safely undertaken in such cases, and if, at a later period, the lateral folds thus left produce any obstruction or inconvenience they may be excised by scissors or Pennington clips.

Treatment of Cases in which the Rectum opens at some Abnormal Position on the Skin.—Interference in such cases is not generally urgently demanded, especially if the opening be in the perineal, sacral, vulvar, or abdominal regions. The exit is generally sufficient for functional purposes during early life, and the time at which operative interference is undertaken can be selected with reference to the convenience of the family and the condition of the child. Happily in these cases there is no necessity for prolonged, blind dissection in search of the missing gut.

The abnormal opening, if it be not too far removed from the natural anus, should be dissected out, together with the rectal pouch, and sutured to the skin at the site of the normal anus. Where the abnormal

opening is too far removed from the perinæum to be brought down and sutured in this position, the rectum should be searched for by perineal dissection, and if found should be brought down and its mucous membrane sutured to the skin at the site of the anus. The fæcal current will thus be turned in the natural direction. The abnormal openings will gradually atrophy and close under such circumstances. If they do not, however, at a second sitting they may be dissected out, invaginated, and closed by Lembert sutures.

Where the abnormal opening is connected with the rectum by a long fistulous tract, as in those cases where it opens at the prepuce, the lower end of the scrotum, or in the glans penis, obstruction will be likely to occur. Such cases demand an early interference. The obliteration of these long mucus-lined tracts, without a too elaborate dissection, is a question of considerable difficulty. The author's opinion is, although he has had no experience in such cases, that the opening into the rectal pouch at the normal site of the anus should be established just as soon as the child's condition will permit. When this has been done, the tract leading to the abnormal opening should be cut across at a point close to its entrance into the rectal pouch, and a ligature should be applied to the proximal end. This end should then be invaginated into the rectum and retained there with Lembert sutures. The cut end of the remaining portion of the tract should be closed in the same manner and left to atrophy after it has been thoroughly cleansed. It is a well-known fact that mucous tracts thus abandoned, so far as functional activity is concerned, do atrophy and become nothing more than fibrous cords which are not detrimental to the individual.

Where the abnormally placed anus is at some such remote position, as on the abdomen, the chest, the shoulder, or in the neck, the ingenuity of the operator will be put to the severest test to devise some means of establishing a convenient outlet for the fæcal material. It is improbable in such cases that the rectal pouch is or can be brought near to the perinæum. If a loop of the sigmoid or colon can be brought down and sutured at the anal site it will probably serve all necessary purposes. Otherwise an artificial anus should be made in the left inguinal region after the manner of Witzel or Bailey. Certainly no interference beyond dilating the abnormal opening to facilitate the escape of the intestinal contents should be undertaken in such a case until the child has arrived at an age to justify a prolonged and difficult surgical operation.

Treatment of Cases in which the Rectum opens into Some Other Viscus.—This class of cases embraces about 40 per cent of all cases of malformation of the rectum, and the large majority of them are those in which the rectum opens at some point in the vagina or vulva.

The Rectum communicates with Bladder.—Where the rectum opens into the bladder it is a question of immediate operation or death in a short time from infection.

The size of the opening into the bladder has little to do with the prognosis. The freer the discharge of the intestinal contents into the bladder the more rapid will be the progress of infection. The prognosis in this condition is always unfavorable, and yet operation offers the only hope of life.

All teachings with regard to such malformations are largely theoretical. Some few cases have been operated upon, but scarcely two by the same method. Martin (*Dict. des Scs. méd.*, vol. xxiv, p. 127) suggested as a means of relief in these cases that a perineal anus should be established and the recto-vesical septum incised down to the neck of the bladder, thus furnishing a free exit for the combined contents of the two organs. This appears to be a very blind operation, and its eventual benefit to the child would be of a most doubtful character.

From a rational point of view there are two methods of procedure in such cases, both of which involve abdominal section. The author believes such cases should be operated upon at the earliest possible moment by a full, free incision into the abdominal cavity. After this the condition of the parts and the location of the opening into the bladder will determine the future steps of operation. Where the communication is high up and can be reached, it is perfectly feasible to separate the two organs at the point of communication, invaginate the openings into each, and suture them, provided there is an external orifice for the escape of the fecal matter from the rectum. If, however, there is an imperforate anus this condition should be remedied first by proctoplasty or colotomy.

Where the opening into the bladder is low down, in the neighborhood of the trigone, and beyond the reach of the operator to suture with any degree of certainty, it will be better to make a permanent inguinal anus, and close up the lower end of the colon entirely. There is little danger in such cases that the urine will escape upward into the gut, and if the fecal current is shut off from the bladder the distal end of the divided intestine will atrophy, and eventually the communication will close.

The fact that this operation condemns the child to an artificial anus all its life must be considered by the parents and surgeon. These artificial ani are no longer the nightmare which they were in former days. Even in adults they are so made at the present day as to possess almost absolute control, and in a position in which they are comparatively convenient. Now, when such an arrangement is made in infancy, the child is taught from birth to utilize it, and it becomes just as con-

venient as if it were in its normal position. Such an anus made in childhood develops eventually almost as perfect sphincteric control as has the normal anus. Certainly there is no question of choice between the two procedures, if it is possible to carry out the first with any degree of safety; but where the opening is so low down that one can not reach and safely suture it, colotomy is the more conservative operation, and offers a better prognosis.

The Rectum communicates with the Urethra.—In this type of cases the dangers of infection are less than in the preceding variety, and while the escape of meconium is limited the condition is generally not an urgent one. The conditions for surgical interference are also much more favorable, the bowel is always lower down and nearer the pelvic floor, and the point at which the rectum opens into the urethra can be made out by touch or by the use of a fine probe. When it is in the membranous or bulbous portion it will be easy to dissect down upon the rectal pouch, disconnect it from the urethra, and bring the freshened edges of the orifice by which it emptied into the urethra back to the normal position of the anus after enlarging it to whatever extent is necessary to produce a good aperture. When the opening is near the meatus the case should be treated as advised for preputial cases.

The time at which this operation should be done depends largely upon the condition of the child. When there is a free escape of meconium and no distention of the abdomen, the operation may be deferred until the child's strength justifies surgical interference. If, however, the escape of the meconium is obstructed, the abdomen swollen, the child fretful and peevish, the operation should be done at once.

As to what becomes of the opening in the urethra after such an operation as this, one has only to consult his experiences with perineal section for strictures and fistula in adult life. If the urethra is split and the redundant mucous membrane cut away, these fistulous tracts close spontaneously and without difficulty. So also in the child. After the rectum is detached from its connection with the urethra a simple perineal fistula is left, which eventually heals of its own accord. The prognosis in such cases is comparatively good.

The Rectum opens into the Vagina.—In these cases the opening may occur at any point from the margin of the vulva up to the junction of the vagina with the uterine cervix; it is generally free enough to allow the passage of meconium, and even solid matter, without great difficulty; it may be comparatively large, and yet the discharge of meconium be obstructed by an imperforate hymen. In such cases the diagnosis is made from the bulging, greenish membranes between the vulvæ, and incision of the hymen should be the first step in treatment.

If the opening between the vagina and the rectum is not sufficiently free it should be dilated by bougies or a uterine dilator. Further interference should be governed by the condition of the child.

At what age should the operation for vaginal anus be undertaken? In the author's experience, children at the age of three to five years stand surgical operations very well. He has operated upon a large number of children at this age for various conditions of the rectum and anus, and has never yet seen one suffer particularly from surgical shock or hæmorrhage. From this and some experience with the malformation under consideration, it would appear wise to select this period of life for its correction. If, however, the condition is discovered in infancy, and the aperture is too small to admit of the functional activity of the intestine, one may be called upon to decide whether it is not better to operate then than to dilate the opening and wait until later years. The author has no hesitancy in saying dilate it and wait. In general the opening will be found sufficient for functional purposes, and the time most suitable and convenient may be elected for operative interference. Many methods have been devised for carrying out this procedure. One of the first operations consisted in making an incision through the perinæum and anus up to the abnormal opening in the vagina, thus giving an exit to the faecal matter through the perinæum at the site of the normal anus. A tube or cannula is passed into the rectum and kept there until the anterior portion of the wound has healed. Such operations are far from successful. Later on the operation was modified by making this same incision, cutting and dissecting the mucous membrane from around the margin of the abnormal opening, and suturing the anterior edges of the gut together from this point down to the level of the perinæum; the mucous membrane of the gut was then sutured to the skin at the site of the normal anus, and the perinæum and vagina were closed by deep sutures as in the ordinary operations for complete rupture of the perinæum. Such operations were fairly successful, but it was a long time before the patient obtained any sphincteric control over the movements of the bowel.

Another operation consisted in dissecting upward in the perinæum until the rectal pouch was found; the mucous membrane of this pouch was then sutured to the skin at the margin of the anus, thus leaving two exits to the rectum, one in the vagina and one in the anus. The operators trusted that, owing to disuse, the opening in the vagina would close spontaneously. Such hopes, however, were fallacious. Later on they were led to attempt to close the abnormal openings by cauterizing them, which procedure led to a number of successes, but was not altogether satisfactory. Especially was this operation unsuc-

cessful in cases in which the condition had been allowed to reach adult life, owing to the fact that the sphincter muscles having never been brought into action had atrophied and practically disappeared, consequently the patients upon whom the operation was done suffered from persistent incontinence of faecal matter. After this the problem of correcting the malformation was practically solved by Rizzoli (Gross's System of Surgery, vol. ii, p. 205, sixth edition), who says that inasmuch as these vaginal ani always possess a certain amount of voluntary control there must exist around them a sphincter muscle, and that the preservation of such an organism would be of the utmost importance to the child. His method of accomplishing this is as follows: An incision is made from the posterior margin of the vagina backward to the point at which the normal anus should end; the perineal tissues are carefully dissected to reach the rectal pouch; this is then carefully loosened from its attachment all around, and the vaginal anus is dissected out intact, dragged down to the position of the normal anus, and carefully transplanted there. The perineal tissues in front of the gut are then brought together by buried catgut or deep silver sutures, and the mucous membrane of the vagina is carefully sutured, thus restoring completely the recto-vaginal septum, and closing all communication between the two organs. By this procedure the natural opening in the intestine is perfectly preserved with all its sphincteric power, and the danger from non-union or retraction of the parts is practically obliterated. It also has the great advantage of restoring the perinaeum and recto-vaginal septum, a matter of the utmost importance to the woman. Another advantage in this operation is that it practically obliterates any diverticulum in the rectum at the point of communication with the vagina, such as is very likely to occur in operations by other methods; and, again, it obviates the necessity of repeated operations such as were necessary in the cases of Aveling (Lancet, December 20, 1884), and Buckmaster (Trans. Amer. Gynæc. Ass'n, 1894, vol. xix, p. 275). Cases sometimes occur in which this operation is not feasible, owing to the fact that there are two or more openings into the vagina, as has been reported by Ainsworth (Bodenhamer, *op. cit.*, p. 227). In such instances much ingenuity must be exercised in performing a plastic operation which will cover the necessities of the case. If two openings are close together they may be converted into one by a simple incision, the margins of which may be puckered with a purse-string suture and attached by the mucous membrane to the margin of the skin at the site of the normal anus. When, however, these openings are separated by some considerable space, it would be better to dissect out the lower opening, completely detach the rectum from all its attachments up to the upper opening, and close this by inversion and the Lembert sutures.

The lower abnormal anus should then be transplanted to the position of the normal anus.

The Rectum communicates with the Uterus.—Such cases are practically so rare that one can scarcely speak with any definiteness concerning their treatment. As stated before, the author knows of but one case, and no operation was performed to remedy it. It seems, however, that the proper proceeding in such cases would be to establish an anus at the normal site, if possible, and to follow this by laparotomy, division of the canal connecting the two organs, and inversion and suture of the apertures in each, after the same manner as has been advised in those cases in which the rectum communicates with the bladder. If, however, the rectal *cul-de-sac* ends at its communication with the uterus, the establishment of the anus at the normal position would be practically impossible. The only recourse left to us under such circumstances would be the establishment of an inguinal anus and the closure of the lower end of the gut. If, however, upon opening the abdomen for this procedure the sigmoid flexure and rectal pouch are found sufficiently long to reach the perineal floor, one might dissect the rectum from its attachment to the uterus, close the opening in that organ, and finally bring the opening into the intestine down and suture its mucous membrane to the skin at the site of the normal anus. Such a proceeding, however, has never been attempted, as far as can be learned, and the above remarks are simply suggestive.

The Rectum and Anus are Normal, but have opening into them the Ureters, the Uterus, or Vagina.—Some 20 cases of such malformations have been described by various authors. Bodenhamer has collected 7 in which the ureters terminated in the rectum, and 9 in which the vagina or uterus ended in this organ. In those cases in which the ureters terminated in the rectum the bladder was found absent, and the rectum performed all the functions of both organs. Any operation intended to remedy such a deformity would be irrational, inasmuch as there would be no reservoir into which to transplant the ureters. The dangers of infection traveling from the rectum up the ureters and into the kidney will always exist; although Nature seems able to protect herself in such cases, and persons with these abnormalities have lived to a comparatively good age without suffering from such complications.

In those cases in which the uterus or vagina opens into the rectum, operative interference may be safely undertaken if a proper period and state of the patient be selected. Unfortunately the victims of this malformation rarely realize their condition, and cases have been known to grow to womanhood, marry, and bear children successfully, even although afflicted with this deformity.

Ball says: "It does not appear that there would be greater difficulty in operating upon these cases than in those of a converse condition already described, where the rectum opens into the vagina." This might be so or not, from the fact that where the vagina or the uterus opens into the rectum the communication is not by a small, narrow opening, such as is the case in the inverse condition, but by a large patulous communication which it would require an extensive operation to close. Only one operation, so far as I am aware, has been undertaken for this condition, and that was successful (Bodenhamer).

CHAPTER III

EXAMINATION AND DIAGNOSIS

THE importance of local examinations in diseases of the anus and rectum can not be overestimated. Here more than in any other portion of the body are the diseases liable to progress rapidly, and carelessness and errors in diagnosis often allow the simplest affection to assume great magnitude. In constitutional and self-limited diseases delay of a day or two in making the diagnosis seldom results in any injury to the patient; but in progressive diseases, such as those generally found in the rectum, a delay of even a day may be followed by the most disastrous results, to say nothing of the discomfort and suffering which the patient is unnecessarily forced to bear. The author has reported elsewhere (*Transactions Georgia State Medical Association*, 1899) a case of ordinary thrombotic hæmorrhoids in which the family physician failed to recognize the condition. After two or three days the thrombus became infected, and an abscess developed which burst into the rectum, thus constituting a blind internal fistula, necessitating an operation and more than two months of convalescence. In the abscess was a broken-down clot, showing clearly that the trouble had originated in a simple thrombotic hæmorrhoid. Under proper diagnosis and management, this patient would have been cured in three or four days, and he would have been spared not only the loss of much time and a great deal of suffering, but also an actual danger to his life from sepsis. In the large majority of rectal diseases an early diagnosis and proper treatment will result in a rapid cure, and in malignant diseases of the rectum it is only in the early stages that there is hope to eradicate them. In such cases, therefore, positive and immediate diagnosis upon the first appearance of the symptoms is of paramount importance.

The subjective symptoms in rectal diseases are always referable to more than one pathological cause. They are of great value, but no diagnosis should ever be made of any rectal condition until the patients have been thoroughly examined, both by digital and instrumental methods. The embarrassment of the patient and the disagreeable task for the doctor will never be an excuse for the omission of such examina-

tions. Diagnosis of rectal diseases in their early stages is sometimes very difficult, inasmuch as the subjective symptoms are often referred elsewhere. Such reflex symptoms should be known and appreciated by every physician, and should emphasize the necessity of local examination. The methods employed in the examination and diagnosis of rectal diseases may be classified as historical, digital, and instrumental.

Historical Examination.—When the patient consults the doctor for any form of disease, whether rectal or otherwise, a careful review of his family and personal history is imperative. It is sometimes tedious and monotonous to listen to a patient tell his own story in his own way, and often much that is irrelevant is introduced; but after all it has its advantages. It calms his nervous sensibilities and makes him feel at home with the physician, to whom he is, perhaps, a stranger. There is nothing so conducive to confidence in a patient as the impression that his physician is patiently and thoroughly interested in his case. Therefore, when such patients enter the consulting-room, a history of their personal and family life should be patiently heard. Heredity may or may not have any great influence in diseases of the rectum, but many patients have a very positive impression that it does, and to these the fact that the doctor is looking into it is very consoling. A man's occupation, his environments and his habits may or may not have anything to do with the symptoms from which he is suffering; but it is very important in advising individuals as to regimen that one should be sure they are not already following this very course, even to excess. As an example of this, the author had a patient consult him some years ago who was much displeased with a consultation which he had had only a few hours previously. The cause of his discontent was that the doctor had told him he needed more physical and outdoor exercise. The young man was an athlete who had gone stale from over-training, and was well aware of the fact that any increase of exercise had persistently made him feel worse. A man's environments may not have anything to do with his disease, and yet when one is unacquainted with these, he may sometimes carelessly attribute symptoms to them or give advice concerning them that make him appear ridiculous. A calm hearing, therefore, of the patient's history will be advantageous in more ways than one. After this has all been told, one may begin a direct examination with regard to the symptoms which have been detailed. The method of the physician's examination often impresses a patient favorably or unfavorably, and has much to do with gaining or losing his confidence. If our inquiries are at random and our questions are ambiguous, and if we omit to inquire into what the patient considers his important symptoms, he is very likely to suppose that we know little about them. Whereas, if our inquiries are concise, direct,

and to the point with regard to the symptoms of which he complains, and if we by a knowledge of reflex effects call his attention to symptoms which he has inadvertently observed, or which he has neglected to observe, he will at once be convinced that the examiner knows what he is talking about, and will submit with confidence to his directions. In recording the history of a patient, his name, age, home address, vocation, and domestic station should all be noted. His family history should be briefly but carefully put down. His personal history from infancy ought to be inquired into, and all the material facts with regard to early habits and diseases should be elicited as far as possible. These early habits and diseases often have a material bearing upon rectal diseases. Many patients are aware of the fact that they have been constipated from infancy, and some will detail indistinct recollections of rectal diseases in early life. The knowledge of these facts is of the utmost importance to the examiner. After such general facts have been taken cognizance of, the direct and local examination of the patient should be taken up. The symptoms suggesting local examination of the rectum may be enumerated as follows:

First, indigestion, flatulence, loss of appetite, irregularity of the bowels, or constipation.

Second, vague aching pains about the pelvis or sacral region and shooting down the left leg.

Third, a sense of constriction or weight about the pelvis. This is especially important in males.

Fourth, spasmodic or periodical dysuria, without adequate cause, in the genito-urinary apparatus.

Fifth, a tendency to diarrhœa, especially in the morning.

Sixth, the presence of mucus, pus, shreds, or blood in the fœcal discharges.

Seventh, irregular menstruation or dysmenorrhœa in young women.

Eighth, restlessness at night, picking the nose, scratching of the abdomen or anus, and vitiated appetite in young children.

All or most of these symptoms may arise from diseases of the rectum, and at the same time many of them may be due to other affections. The fact that they are very frequently due to rectal disorders renders a local examination imperative. These facts should be known to the family practitioner more thoroughly even than to the rectal specialist, for he is the one first consulted in regard to these conditions, and it is nearly always through his advice that the rectal surgeon is consulted. The patient generally knows there is something wrong with his rectum when he consults the specialist, and therefore these reflex symptoms are not of so much importance in his examination as in that of the family practitioner. The latter should be prepared to examine the rectum

quite as well as the chest, and he should not hesitate to do so in any case presenting symptoms referable to it. When through delicacy and bashfulness the patient refuses to allow such an examination, the physician should equally as firmly refuse to prescribe for the symptoms. After the general facts and history have been recorded, and their bearings duly weighed, one should then inquire into the existing conditions, as follows:

State of the Bowels.—One should examine as to the habitual state of the bowels: whether it is normal, constipated, or diarrhœal. If the patient is constipated, to what extent does this condition exist. Is there a stool every day, or does it only occur when laxatives have been taken? When the stool does occur, is the fœcal material soft, consistent, and of normal shape, or is it small, tape-like, or hard and in little balls? It is important to know when the stool has been passed whether it is of sufficient quantity and clean, or covered with mucus and tinged with blood. If the condition of the bowels is diarrhœal, one should inquire whether the passages are watery or semifluid, whether large quantities are passed and painlessly, or whether the passages are scanty, mucous, and attended with pain, tenesmus, and subsequent exhaustion.

Pain.—If the patient gives a history of pain, one should inquire as to the exact point at which it is felt; whether at the anus, within the rectum, in the sacral region, about the pelvis, in the inguinal region, or, as often happens, in the uterus, neck of the bladder, or urethra. It is also important to know whether it extends to other regions. Pain shooting down the leg, for instance, has been described by Hilton as constantly associated with rectal disease. The time at which the pain occurs should also be inquired into; whether it is before or after stools, and how long it lasts; whether it is persistent, occurs with every stool, or only occasionally. Again, one ought to know the nature of this pain; whether it is acute, cutting, burning, or of a dull aching character. All of these symptoms are of material importance, for they point with more or less accuracy to the proper diagnosis of the case.

Itching and Spasm of the Sphincter.—Patients, when asked about pain in the rectum, often say they have no real pain, but rather discomfort, uneasiness, and itching, or sometimes a spasm of the anus. The time and circumstances of such symptoms should be carefully noted.

Protrusion.—The patient should be asked if he suffers from any unusual protrusion about the anus; if so, we should inquire as to when it occurs and how it is brought about; whether by straining or upon slight exertion. One should also know whether it disappears spontaneously or if it is necessary to restore the parts to their normal posi-

tion; if so, is the restoration difficult or easy. It is necessary also to know whether such protrusions are hard or soft, smooth and regular, or localized and nodular. One should furthermore inquire if the patient can produce the protrusion at will, or whether it only appears when he goes to stool. He should also know whether there is any pain produced by handling the protrusion. If it is present at the time of examination, one should examine carefully the rugæ, whether they are circular or run up and down, and he should also observe any abrasion, ulceration, or other abnormalities upon the parts.

Habits.—The habits and history of the patient should be most carefully inquired into. Is he accustomed to the use of enemas? Is he in the habit of sitting long at the shrine of Cloacæ with his pipe and paper as companions? Is there an unsatisfied feeling of something more to come away when the bowels have moved? Is he the victim of pederasty? Has he a history of venereal disease? Has he an hereditary tendency to tuberculosis or to malignant growths?

All these points should be carefully noted, and by the time one has obtained a satisfactory account of them, he will generally have information such as will aid and direct him materially in the local examination.

Preparation of the Patient for Examination.—In order to make a proper and careful examination of the rectum, all constricting clothing should be removed or loosened: corsets, tight waistbands, or anything which has a tendency to crowd the small intestines down into the pelvis, or prevent their rising upward toward the diaphragm, should be removed. The rectum should always be empty in order to make a final and satisfactory examination of this organ; but sometimes, where an imperfect or unsatisfactory history of the habitual state of the bowels has been obtained, it is better to examine the patient as to this condition first, then move the bowels with an enema, and proceed with the complete examination later on. The author has time and again had patients come to him who had previously taken enemata, and yet found their rectums full of hard, inspissated faecal material. Whether this material had come down into the rectum after the movement of the bowel, or whether the injection had failed to remove it, it was impossible to say. As a rule, therefore, if it is practicable, the first examination of a patient's rectum should be made before an enema is given. By such an examination, if pus, blood, mucus, or inspissated faecal material are present, they can be seen; whereas, if an injection has been taken and the rectum thoroughly cleaned out before the physician examines it, these substances may be entirely removed, and the condition causing them may be overlooked. It requires a little more time to make the double examination in this way, but in the

author's experience it has been more satisfactory. If upon the preliminary examination the rectum is found full of faecal matter, or substances interfering with a thorough diagnosis, an enema should be given and the patient allowed to retire until these have been passed. Where the physician's office is not so arranged that the toilet-room is adjoining it, he should always have at hand a commode, so that in case of an emergency after giving the enema the patient may relieve himself at once without the danger of an accident in passing from one room or floor to another in order to reach the toilet. The cut here given (Fig. 49) illustrates a very practical and efficient commode for the physician's office. It is so arranged that there is very little escape of faecal odor from it, and at the same time one would hardly suspect that it was anything but an ordinary stool. For the specialist's office certain double faucets and stopcocks have been arranged by which a patient can be given an enema or irrigated directly from the water-pipe. Such an arrangement is described by Dr. Kelsey as follows:



FIG. 49.—COMMUNE FOR OFFICE USE.

It consists "of a glass jar holding one gallon, which stands upon a shelf 7 feet above the floor, and is filled by a rubber tube connecting with what is popularly known as a barbers' faucet, by which either hot or cold water can be drawn from the same tube at pleasure." The apparatus may also be used for irrigating the rectum, the temperature being regulated by a thermometer in the jar, and the flow may be kept up indefinitely.

This is an excellent arrangement, but the jar should not be set more than 3 feet above the level of the patient, for too great force is objectionable for either irrigation or enemata. It is not indispensable, however. The ordinary fountain syringe serves every purpose for giving rectal enemata. It can be sterilized, and the tips, at least, should be, after each use of them. The question of what sort of a tip is best for giving a rectal enema will be often asked of a physician. A hard-rubber tip with an olive-shaped end, smooth, polished, and well lubricated, or a medium-sized soft-rubber catheter, are the only instruments with which a patient ought ever to administer an enema to himself. When the physician or a trained nurse is called upon to give the enema, the tip described, or a small-sized Wales bougie, are the instruments of choice. The ordinary Davidson bulb syringe is preferable to the fountain syringe

when the injection is given through a long tube like the Wales bougie, inasmuch as the impulse lifts up the folds of mucous membrane from in front of the bougie and facilitates the passage of the instrument upward into the sigmoid flexure.

Immediately after the enema has passed, the patient should be laid upon a lounge or table before any protrusions or prolapse, which may have occurred during the action of the bowel, have disappeared. Sometimes it is well to feel or examine the parts before the patient leaves



FIG. 50.—LEFT LATERAL OR SIMS'S POSTURE.

The bed of the lounge being raised so as to form a table.

the commode, as motion, especially walking or climbing up on a table, may cause their retraction, and the opportunity of viewing them will be thus lost. In order to avoid this, it is well to instruct the patient before he retires to the toilet-room or seats himself upon the commode, that he shall not replace any prolapse, and shall simply use a little moist cotton or gauze in cleansing himself. One should always have present in his office, if possible, a trained female nurse or an attendant to wait upon ladies and prepare them for examination, to adjust their clothing, and assist in the administration of enemata. She should not be present, however, during the questioning of the patient, as this part of the examination should be confidential. All unnecessary exposure of the patient's person should be avoided; ladies should be properly postured and covered with a sheet by the nurse before the examination

is begun, and in case of male patients this should be done by the surgeon before the nurse is called in.

Position for Examination.—There are four positions in which a patient may be examined for diseases of the rectum, and each of them has its special use. The first and most generally useful is the left lateral, so-called Sims's position (Fig. 50). This is obtained by laying the patient upon the left side, the chest upon the table, with the left arm behind the back, the thighs well flexed upon the body, and the hips elevated upon a hard pillow. In the large majority of cases this position is sufficient for all examinations, whether digital, ocular, by specula, or through the sigmoidoscope. In very stout people, however, the rectum is so retracted and covered in by the large folds of the buttock that it is difficult to obtain a good view of the parts in this position, and almost impossible to introduce an ordinary speculum with satisfaction. In such cases other positions are found more satisfactory.

Exaggerated Lithotomy Position (Fig. 51).—This position is ordinarily the most convenient for operations upon the rectum, and it also has

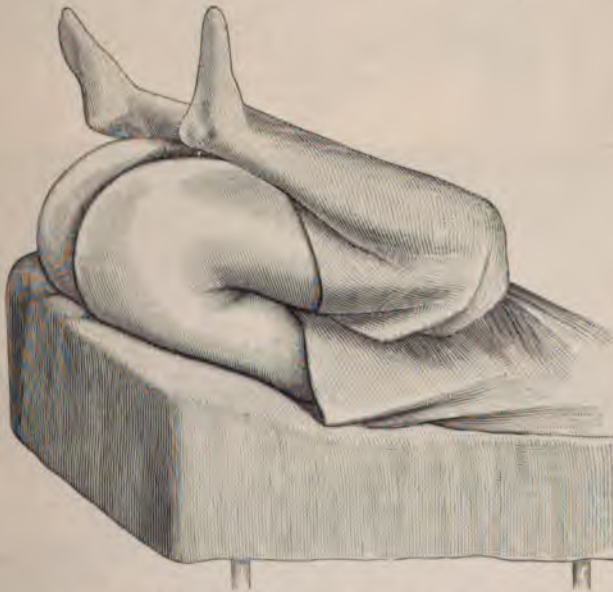


FIG. 51.—EXAGGERATED LITHOTOMY POSITION. (Bryant.)

its field of usefulness in examination. The author has several times attempted to introduce the sigmoidoscope in the Sims's and also in the knee-chest posture without avail, and has succeeded with comparative ease after having placed the patient in the lithotomy position. In stout patients this position affords an excellent view of



FIG. 52.—INCORRECT KNEE CHEST POSTURE.



FIG. 53.—CORRECT KNEE-CHEST POSTURE.

the anus, and in females it enables us at the same time to examine the condition of the uterine organs and determine their influence upon the rectal symptoms. Every physician's office is furnished with some table, chair, or device by which such a position can be easily obtained.

The Knee-chest Posture (Figs. 52, 53).—This is obtained in several ways. Where the patient is strong and able to retain himself in posi-



FIG. 54.—PATIENT HELD IN KNEE-CHEST POSTURE BY STRAPS AND BANDS (Kelly).

tion for some time, or where the examination is to be very brief, he may be placed upon a table resting upon his knees, the shoulders or chest lying upon the same level as the knees, the body well flexed

upon the thighs. In this position the weight of the abdominal organs is taken entirely off the rectum, and the dilating effect of atmospheric pressure can be easily obtained. It is almost impossible to maintain this posture under anaesthesia without a specially prepared apparatus for holding the patient, such as that employed by Dr. Howard Kelly (Fig. 54). Such an apparatus could, of course, be used without an anaesthetic, but it would be very uncomfortable to the patient. Moreover, this position, although a most useful one, is an exceedingly embarrassing one, especially to ladies; it is difficult to induce them to



FIG. 55.—PATIENT IN KNEE-CHEST POSTURE ON MARTIN CHAIR.

assume it in the first place, and very difficult for them to maintain it in the second. Martin, of Cleveland, has devised a complicated but exceedingly useful chair (Fig. 55) by which the patient can be placed in this position and held there for an indefinite period without much discomfort or embarrassment.

The Squatting or Stool Posture.—This position is not generally given as one in which to make examinations. The author has found it very use-

ful, however, in a number of conditions. A patient sometimes finds it very difficult when lying upon the side, or when in the knee-chest posture, to strain and bring into sight protrusions or prolapses which habitually occur when at the stool; but when in this position he can easily produce them. When a patient is in other positions, especially the knee-chest posture, prolapse of the third degree is likely to recede, and the diagnosis may be impossible; whereas in the squatting posture such a prolapse is easily brought down by the patient's straining, so that it impinges upon the end of the finger introduced into the anus, and the diagnosis is easily made. The position is also useful in cases of stricture and tumors of the rectum which are above the reach of the finger. When they are only removed a short distance above the reach of the index finger, if the patient is placed in this position and caused

to bear down, they may frequently be brought within reach, and thus information may be elicited which could not be otherwise obtained except by the administration of an anæsthetic.

Apparatus.—There is great difference of opinion among the medical men and specialists as to the advantages of lounges, chairs, or tables for the examination of patients. Ordinarily a good gynæcological table will serve every purpose. A lounge is generally too low for examinations, but it is sometimes of the greatest convenience in the doctor's office. Chairs also have advantages, in that the patient is seated thereon and by special mechanism placed in any position desired by the operator. The author uses a lounge devised by the late Dr. Little (Fig. 56). The



FIG. 56.—THE LITTLE OFFICE-LOUNGE CLOSED.

bed of the lounge is 5 feet long and $2\frac{1}{2}$ feet wide, and its mechanism is simple. When it is lifted up it forms a table $3\frac{1}{2}$ feet high (Fig. 50), and is abundantly large for any operation or position which may be required in a physician's office.

Recently, however, in order to obtain the advantages of the knee-chest posture, and to maintain it without inconvenience and exhaustion to a patient, the ingenious chair of Martin has been used. This chair is a modification of the well-known Yale gynæcological chair, which by a crank places the patient from a Sims's position into a perfect knee-chest posture without his moving or being inconvenienced. A patient is seated in the upright position, his right leg crossed over the left, and the left arm rests upon the back of the chair. The pillow is held with the right arm underneath the head, and the chair is thrown back-

ward into a horizontal position. The retaining shoulder-strap is placed over the right arm and attached to the snap which holds it. With the lever in the right hand, the crank which controls the screw is then rapidly revolved and the patient is turned slowly and gradually into the posture indicated in the cut. The head of the patient rests upon a device which is arranged so as to support it, and in this way every advantage of the knee-chest posture is obtained. For specialists in rectal diseases this chair is of great assistance, and for one who is in the habit of using a chair for gynecological and other work, the combination in no wise detracts from its ordinary usages. Pennington, of Chicago, has devised a table in which Martin's principle is carried out. It is light and can be easily transported from place to place. All such appliances are convenient and of assistance, but they are not absolutely necessary.

In all examinations of the rectum it is better to begin with the Sims's position. It is the least embarrassing to the patient, and is generally the only one which will be necessary.

External Appearances.—Having placed the patient in position, a careful observation of all external appearances should be made. The shape of the anus should be noted; whether it is normal, protruding, or retracted and funnel shaped, and whether the pigment about it is normal, increased, or reduced. The epidermis should be examined carefully for parasites and pediculi, and its condition noted; whether it is normal, white and sodden, or red and excoriated; whether it is moist or dry and brittle, smooth or nodular and swollen at points, and whether there are any scars, ulcerations, or fistulous openings about the anal orifice. Palpation of the parts is of importance, for by this are elicited any tense or painful points that indicate abscesses or peri-rectal inflammation and induration. By palpation it is possible to follow up a fistulous tract through its indurated line, and thus to make a diagnosis without the use of a probe, which is always painful and often unsatisfactory. If there are any external growths, such as condylomata, fibroids, polypi, or connective-tissue hæmorrhoids, these should be carefully examined, and their condition, whether painful, inflamed, constricted, or thrombotic, should be noted. Little thrombi about the anus are very frequent, and sometimes cause a distress entirely out of proportion to their appearance. If there is a protrusion present, one should carefully observe all its characteristics, especially the direction of the rugæ, and whether or not it is excoriated or ulcerated. Epithelioma of the anus is often apparent upon the external surfaces, and where it is so one may clip off a small section for microscopic examination without much pain to the patient by the application of cocaine or orthoform. Assuming that no such external abnormalities

exist, the examiner should proceed to look higher up. With the buttocks pulled well apart and the patient straining slightly, one can see pretty well all of the anal canal. If there be a fissure or hæmorrhoids they can generally be brought into view by this means, and polypi low down may also be seen during this part of the examination. One should be careful to note the condition of the muco-cutaneous border of the anus, for frequently the dragging of the buttocks apart stretches this membrane, and if it is in an unhealthy condition such as the dry, brittle state in which it is found in atrophic catarrh of the rectum and in some forms of syphilis, it will crack in numerous little points, sometimes bleeding, but more often appearing like little button-holes—not deep enough to cause actual pain, but sensitive to the touch and to irritants. At this point one should observe the condition of the radiating folds of the anus. If one or more of them is inflamed or swollen, it would indicate some ulceration or irritation in that area of the rectum directly above it. If, however, they are all congested and hypertrophic, some general inflammation or affection of the rectum will be indicated. Valvular constriction of the anus may sometimes be determined by such an ocular examination.

Digital Examination.—Having proceeded thus far, the physician will have obtained whatever information is possible without digital or ocular examination of the rectum itself. Here the educated finger becomes our most important agent, at least so far as the first four inches of the organ are concerned. This should be well lubricated before any attempt to introduce it into the rectum. The author has tried many substances as lubricants for instruments and the finger in rectal diseases, and has finally settled upon vaseline as the most satisfactory, except in cases where some stimulating or cauterizing substance is to be applied. In such cases one should use some sort of lubricant which can be washed off, and which will not interfere with the action of the drug. Ordinary non-irritating or Castile soap is probably as good as any other substance under such circumstances, but there are a number of vegetable preparations upon the market which serve this purpose very well. Such lubricants should be kept in collapsable tubes. The old pot of oil or jar of grease into which the finger and instruments are dipped day after day, infecting one patient from another, is a relic of medical barbarism, and should be discarded from every physician's office. The vaseline or lubricant in tubes can be sterilized, it is clean and convenient, and the slight increase in expense is inconsiderable.

In introducing the finger into the rectum, one should remember that the anus is closed by a very sensitive, irritable muscle, and that any roughness or undue haste will cause spasm and increase the difficulty and pain of an examination. It should be introduced slowly

and with a boring motion, first upward and forward toward the vagina or prostate until the internal sphincter muscle is passed, and then backward into the ampulla of the rectum. A mistake in directing the finger, or roughness in its use, will cause pain and spasm such as will discourage the patient, and sometimes prevent a thorough examination. As the finger is passed through the anus one should study the condition of the sphincter muscle. A twitching, tender, spasmodic sphincter indicates some acute disease near the margin; a hard, firm, resisting sphincter indicates a chronic condition which has caused hypertrophy of the muscle; and a relaxed, flaccid, lifeless one leads us to suspect some exhausting, malignant, or constitutional disease. As the finger passes beyond the margin of the external sphincter it should be swept around the anal canal to examine the crypts of Morgagni and the pillars of Glisson, to elicit, if possible, the existence of any ulceration or other pathological condition. Hypertrophied papillæ may be diagnosed by this procedure. It is just at this point, between the external and internal sphincter, that the educated finger most often recognizes the internal opening of a fistula, fluctuation of perirectal abscesses, and the presence of small foreign bodies which have lodged in the crypts or been caught in the grasp of the muscles. The education of the finger to recognize abnormalities in this portion of the rectum is the first and most important step in the development of a rectal specialist. Without this tactile erudition one can never make a success in the treatment of these diseases. There is no one thing that will give more satisfaction in practise than the ability to diagnose the internal opening of a fistula by touch. The comfort to the patient, the certainty of the operator when he feels the opening, and the great assistance it affords him in operating upon tortuous fistulous tracts, render this accomplishment of inestimable value to one who practises in this line. An uneven spot, elevated or depressed, with an indurated base, and more sensitive to touch than the rest of the circumference, reveals to the experienced examiner more than any probe can tell, and he who has experienced it a few times recognizes the condition as unerringly as the skilful musician will a string out of tune.

After the examination of this portion of the organ, the finger should be carried through the internal sphincter and swept gently around its upper surface. The impression that internal hæmorrhoids can be felt in this way is a mistake. Unless there is true hypertrophy of the connective tissue one can not feel them at all. He may, however, recognize ulcerations whether simple, tubercular, or specific. As the finger is swept around the rectum the levator ani muscle can be felt and its condition determined. One can also determine whether the mucous membrane is smooth and without the normal folds, thus indicating

atony; or whether it is harsh and dry, thus indicating atrophy of its glands and insufficient secretions. Foreign bodies lodged in the ampulla of the rectum often assume a position just above the internal sphincter, and can be felt by the finger when they are in this position. Polypi and other neoplasms, strictures, procidentia, and inflammatory conditions, may also be diagnosed by this means. A knowledge of the sensation imparted to the finger by the various pathological conditions is indispensable to the proper diagnosis of rectal diseases. The soft, irregular edges of a tubercular or simple ulceration, and the hard, indurated feel of the specific type, require experience to distinguish them. The smooth, soft, slimy feel of a polypoid growth is entirely different from the hard, nodular one of carcinoma. The true fibrous and the soft inflammatory stricture give entirely different sensations to the touch, but it requires education of this sense and experience to distinguish them. The condition of the prostate and the uterus and its appendages should also be carefully noted in digital examination of the rectum. Frequently we are able to feel the nodular surface of an inflamed cervix pressing down upon and irritating this organ. A prolapsed ovary or retroverted uterus, a fibroid or cystic tumor, a hæmatoma, or even an extra-uterine pregnancy, may be made out by digital examination of the rectum. Frequently symptoms referred to this organ are due to diseases elsewhere. A stone in the bladder or urethral stricture may cause rectal symptoms only. The specialist in rectal diseases must therefore practically be an accomplished gynæcologist and genito-urinary surgeon. He may not do the operative work of such, but so far as the diagnostic knowledge is concerned he should possess it in both branches.

While the finger is still in the rectum the coccyx should be grasped between it and the thumb externally, and moved backward and forward to determine whether there is any inflammatory or tender condition about it. Rectoceles, both anterior and posterior, should be thoroughly explored for foreign bodies or hardened faecal masses. As the finger is withdrawn, if the patient is requested to bear down, internal hæmorrhoids, if present, will frequently follow it out through the anus. If there is blood, mucus, or pus in the rectum, it will also follow the finger upon withdrawal.

The odor is also important. That imparted by carcinoma in the rectum, once smelled, can never be forgotten; that of ulceration, whether simple, specific, or tubercular, is entirely different. There is a feculent, sickening, dead smell to the discharge from a carcinoma which is produced by no other disease.

Examination by the finger is practically limited to the first 4 inches of the rectum. With the patient bearing down and the surgeon

pressing upward upon the perinaeum, the thumb being carried back over the coccyx and the fingers over the perinaeum, or *vice versa*, another $\frac{1}{2}$ inch can possibly be gained; but $4\frac{1}{2}$ inches is the limit of digital touch. Where the disease is higher up some other method must be adopted.

Introduction of the Hand into the Rectum—Manual Examination.—

Extending the principle of tactile examination, Simon, of Heidelberg, demonstrated in 1872 the feasibility of introducing the whole hand into the rectum for the purposes of examination. In order to accomplish this, the patient must be anæsthetized, and the hand should be thoroughly lubricated. The fingers are introduced into the anus one after another, and the sphincter muscles gradually stretched until the palm and finally the whole hand is introduced. The dilatation must be very slow and with a boring motion. After the hand passes through the grasp of the sphincter muscle it will slip into the widest portion of the rectum, where the space is ample. This portion of the rectum is not covered by the peritonæum, and there is little danger of injury, as it is very distensible. From this point upward, however, the gut grows narrower, and if Houston's valves are much developed, there will be points at which there is a partial constriction. After the hand has been carried from 4 to 5 inches upward general constriction will begin to be felt, whether the gut is normal or diseased, and from here on the greatest gentleness and care are necessary to avoid traumatism to the gut. In the first portion, above the great ampulla of the rectum, the peritonæum covers the front surface of the gut, and as we ascend it passes more and more to the sides, until it finally entirely surrounds the intestine on a level with the third piece of the sacrum. At this point, where the rectum joins the sigmoid, one will always find a marked contraction in the caliber of the gut; and the introduction of the hand through this is fraught with danger, unless the hand be very small. Whatever examination can not be made by the introduction of two fingers through this contracture had better be left undone until an exploratory laparotomy shall clear up the question. The dangers of the latter are less than the introduction of the whole hand through the recto-sigmoidal juncture. Simon states that with half of the hand passed through this contracture, the abdominal cavity may be examined to the extent of several centimeters above the umbilicus; one rarely has occasion to pass his hand higher up than this. According to Simon's directions, a hand measuring 25 centimeters ($9\frac{7}{8}$ inches) in circumference may be thus introduced without danger. The author believes, however, that a hand that requires a kid glove larger than No. 7 $\frac{3}{4}$ should never be introduced into the rectum except in a life or death emergency. The danger of this procedure has been discussed

by many writers. Four cases have been reported in which death followed the operation. They are as follows: H. B. Sands (New York Medical Record, June, 1874, p. 301) introduced a hand measuring 19 centimeters ($7\frac{9}{16}$ inches) in circumference 12 inches up into the gut (the arm being too large to allow it to pass any farther), but discovered nothing by this examination. One week later he made a second examination, this time introducing his right hand 15 inches above the anus. The circumference of this hand is not stated, but it was presumably larger than his left. By this examination he diagnosed a stricture of the ascending colon. He then did a right lumbar colotomy. The patient died from shock on the following day. In the specimen removed, the "caput coli" showed *separation of the muscular fibers and rupture of the peritoneal coat at 8 inches above the anus*. Some of the longitudinal muscular fibers in the sigmoid were separated, but there was no rupture through the gut wall. We call attention to the fact that the peritoneal injury was not at the rectum but in the caput coli, and the separation of the muscular fibers was apparently as much at this portion as in the rectum itself. Furthermore, attention is invited to the fact that it was impossible for the hand to have been introduced up to the caput coli, and therefore these injuries must have been the result of the operation for colotomy and not of the examination.

Weir (New York Medical Journal of 1875, p. 414) reported the case of a woman, aged fifty, who complained of symptoms of obstruction, and upon whom manual examination was performed. He was unable to make any diagnosis, although he succeeded in touching the kidney with his hand. A lumbar colotomy was performed, and the patient died the next day. The autopsy revealed no peritonitis, but about two teaspoonfuls of free blood in the Douglas *cul-de-sac*. There was a rent in the muscular and peritoneal coats of the bowel on its anterior aspect, just where the peritonæum is reflected from the bladder upon the rectum. The mucous membrane was not ruptured, and there was no evidence of peritonitis. A close stricture of the transverse colon was found with a large accumulation of fecal matter above it. The patient rallied from the operation, it is said, and the cause of death seemed very obscure. If it had been from rupture of the bowel there would have been peritonitis and other symptoms associated therewith. If from shock, it may as well be attributed to the operation of colotomy as to the manual examination. The third case referred to by Weir (Medical Record, 1875, p. 201) occurred in St. Luke's Hospital under the care of Sabine. This patient died at the end of four days, and the post-mortem examination showed a laceration of the mucous coat of the rectum with ecchymosis, but no rupture of the gut. There seems to have been no perforation in any of these cases. Dandridge

(Cincinnati Lancet and Observer for 1876) reported the case of a man with a psoas abscess, who was in the hospital with a condition of supuration apparent, but no diagnosis had been made. On March 22d the doctor explored the rectum with his hand, passing it through what seemed to be a constriction of the bowel, as though it were bound down by a false membrane just above the rectum. Before reaching the promontory of the sacrum, a large swelling posterior to the rectum was observed. The examiner proceeded with due care, exploring the surfaces of the vertebræ, the psoas muscle on both sides of the common iliac, and upward to the bifurcation of the aorta. His associate, Dr. Connor, then repeated the examination. The circumference of the hand is not given in either case. This man suffered from surgical shock and temperature for three days, some evidences of peritonitis developed which practically subsided upon the third day, after which time the patient developed pneumonia and died on the tenth day. The autopsy revealed septic pneumonia with pus in the pleural cavities, and pleural adhesions showing evidences of an old inflammation. There were flecks of recent lymph throughout the peritoneal cavity binding the loops of intestines together. There was no fluid found in the abdominal cavity. The mucous membrane of the intestine was normal. On the anterior surface of the rectum there was a slit-like tear in the peritonæum about 5 inches from the anus. There was no special evidence of inflammation in its immediate vicinity. The mucous membrane corresponding to this rupture was normal. At the same level, on the lateral and posterior aspect, there were two abscesses in the wall of the bowel. Just above the sphincter there was a tear through the mucous and muscular coat, but there seemed to be no infection or inflammatory complication from these. Psoas abscesses and necrosis of the lumbar vertebræ were also found. Dandridge concludes that the peritonitis was due to the rupture of the peritonæum 5 inches above the anus, and to the mucous membrane torn through just above the sphincter; and yet he distinctly says in his report that *there was no evidence of acute inflammation around either one or the other of these points*. It seems that with all the pathological complications in this case, it is rather straining a point to attribute the fatality to the manual examination of the rectum. Thus, taking the four cases, one may say that while they show deaths following this procedure, only one of them (that of Sabine) seems to be clearly due to it. These cases have been somewhat extensively reviewed, because they are so often quoted to show the fatal results of such examinations. They do not appear to be conclusive. At the same time one should not underestimate the dangers of this method. In malignant diseases, in ulcerations, and in cases in which atheroma of the arterial system exists, it should not be undertaken. But in cases

of foreign bodies and of faecal impaction in the sigmoid flexure, the coats of the bowel being otherwise healthy, or for purposes of exploring the pelvic cavity, under the same conditions it may be safely carried out, provided the hand of the operator does not measure over 20 centimeters ($7\frac{1}{2}$ inches) in circumference. The author has done it more than a hundred times, and has not yet had any unfortunate results further than a temporary incontinence of fæces, which lasted for about ten days in one case and less in others. While this method is useful and still has its place in rectal surgery, it has been largely superseded in the last few years by the advances made in instrumental examinations of the rectum.

Instrumental Examination of the Rectum.—Light.—In all methods of instrumental examination of the rectum, the question of light is a very important one. It can hardly be gainsaid that reflected daylight is generally the most satisfactory for rectal examination. When this can not be obtained, the electric light is the best substitute. In large cities or towns lighted by electricity the street current can be used for this purpose. An ordinary hand-lamp with a reflector around



FIG. 57.—ELECTRIC HEAD-LIGHT.

it can be used to throw the light directly into the rectum, or it may be reflected from a head-mirror. The illustration (Fig. 57) shows an electric head-light which is more satisfactory than any other, and which for general illumination of the lower rectum and operative work is all that can be desired. For deep examinations it does not focus as perfectly as the reflected light, and is therefore not so good. In smaller places, where there is no street current, or in the country, some form of storage or dry-cell battery will be found useful. Small electric batteries are in the market which furnish a light of about 6 candle-power. They are easily portable, and some of them have ingenious attachments which make them very useful in other instrumental examinations. A little care in the management of these batteries and renewing the cells occasionally is all that is necessary to supply a most efficient and reliable light for the treatment of rectal diseases. The same batteries are also used for illuminating purposes in the pneumatic proctoscopes, which will be described later on. The complicated gaslight brackets and lamps with condensing

lenses are troublesome and no longer necessary since the electric light can be so easily obtained.

Attached to the Martin chair is an apparatus with many complicated screws and joints for directing the light into the rectum. The inventor uses it with great dexterity, but others have been unable to do so satisfactorily.

A very useful light for night and country practice is that known as the acetylene bicycle-lamp. This burns for a long while after it has once been charged, and gives a very bright and concentrated light, which can be used either directly or by reflection. One of these lamps of small pattern is a very convenient adjunct to a general operating bag.

Kelsey advises carrying in such a bag a quantity of magnesium strips which, being burned, produce a very bright light for examinations at the patient's house. To one in the habit of using the pneumatic proctoscope, such aids will be unnecessary, inasmuch as he will always carry along with him the little battery belonging to this instrument, and this will supply abundant light. One of the best of these batteries is made by the American Endoscopic Company.

Specula.—Formerly, that portion of the intestine above 5 inches was practically a *terra incognita*. Within the past few years, however, thanks to Howard Kelly, we have become as familiar with the appearance of the upper portions of the rectum as we are with that of the vagina or any other open cavity of the body.

The old-fashioned specula only gave us a partial view of the first 4 or 5 inches. They served their purposes very well, and as instruments for treatment some of them are even now superior to many of the modern instruments, but their field is very limited. The intent



FIG. 58.—KELSEY'S
RECTAL SPECULUM.

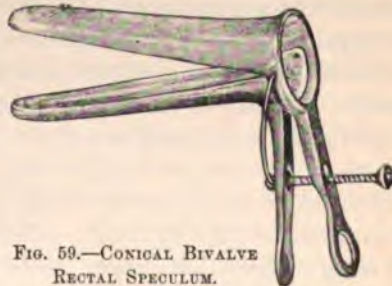


FIG. 59.—CONICAL BIVALVE
RECTAL SPECULUM.

of every speculum is to afford a good view of as much of the rectum as possible. As will be seen at a glance, the instruments illustrated (Figs. 58, 59, 60) afford only a partial view of the circumference of the intestine, and a very limited view of its length. The Sims's rectal speculum (Fig. 61) would give a very fair view of the anus and rectum

for 4 inches up, provided the patient had fortitude enough to bear the pain; but where there are hæmorrhoids, polypi, or tumors of the rectum, they prolapse into the fenestra of the wire blades, and being caught cause great pain upon withdrawal of the instrument. It should not



FIG. 60.—GANT'S OPERATING RECTAL SPECULUM.



FIG. 61.—SIMS'S RECTAL SPECULUM.

be used except under general anæsthesia. The same objection may be offered, only in a less degree, to the Kelsey speculum.

The O'Neill speculum (Fig. 62), which undertakes to combine in one the bivalve and fenestrated conical specula, is sometimes a very useful instrument. The blades are likely, however, to pinch the folds of the mucous membrane or hæmorrhoidal developments and cause considerable pain. It only gives an imperfect view of about 4 inches of the rectum.



FIG. 62.—O'NEILL'S RECTAL SPECULUM.



FIG. 63.—AUTHOR'S CONICAL FENESTRATED SPECULUM.

The speculum illustrated in Fig. 63, devised by the author, is a modification of the Brinckenhoff speculum, with two fenestra. By a turn of one-quarter of a circle

it gives a view of the entire circumference of the rectum; it is made in two sizes, one 3 inches and the other 6 inches long, thus practically giving a view of about 5 inches of the rectum. Up to the time of Kelly's paper in 1895, this was probably the most satisfactory speculum for rectal examination, and it is still a very useful instrument in the local treatment of hæmorrhoids, diseases of the crypts of Morgagni, internal blind fistula, and ulcerations in the lower portion of the organ.

Small laryngoscopic mirror
A small laryngoscopic mirror may be used in connection with this instrument in order to obtain a perfect view of the anterior and posterior *culs-de-sac* of the rectum which dip down behind and in front of the internal sphincter. This mirror also serves to examine the crypts of Morgagni, and to determine any fistulous openings about the lower portion of the rectum.

The ordinary Sims's vaginal speculum, such as is possessed by every surgeon, has been variously modified by Van Buren, Kelsey, Helmuth, and others (Fig. 64). The modifications all consist in removing one end of the speculum and adding a straight handle so



FIG. 64.—VAN BUREN'S
RECTAL SPECULUM.

that the buttocks will not interfere with its introduction into the rectum. These are all useful instruments and the rectal specialist should possess them; but to the general practitioner they are not a necessity, for he can get along very well with the ordinary Sims's speculum. For use in connection with this instrument one should possess some sort of a rectal retractor. I have found Pratt's (Fig. 65) very satisfactory, although the physician may easily arrange one for himself out of stiff copper wire, bending it to suit his own convenience.

The self-retaining speculum of Mathews (Fig. 66) is a favorite one with many operators, especially in the West; but it is open to the same objections that have been mentioned in reference to the Sims's rectal speculum.

Formerly the Ferguson tubular vaginal speculum was used by the introduction of a rectal bougie through it as an obturator, and thus introduced into the rectum. It formed a very satisfactory instrument for the examination of this organ so far as the instrument reached.

In 1863, Bodenhamer introduced to the profession a long steel tube



FIG. 65.—PRATT'S
RECTAL RETRACTOR.

arranged with a sort of a spiral conformation which made it flexible at the end, and thus enabled him to pass it into the sigmoid flexure. He said by this means and a system of mirrors he could observe the condition of the gut above the recto-sigmoidal juncture, and also the mucous membrane of the rectum all the way as he withdrew it. The instrument was never generally adopted.

Andrews, of Chicago, later on devised what is known as his tubular specula, one being straight and the other curved so as to conform with the curvatures of the rectum.

He claimed that with this instrument he was able to examine the sigmoid flexure, and to thoroughly observe all its circumference by the aid of a concave mirror which is introduced into the speculum after the obturator is withdrawn.

Cook, of Indianapolis, also devised a tubular speculum similar to Andrews's.

The advice in regard to their use by the inventors is to lay the patient upon the side, introduce the speculum, and examine the mucous membrane of the intestine as it prolapses over the end of the instrument upon its withdrawal. The principle of atmospheric ballooning or pneumatic distention is never hinted at in any of their writings, nor in any of the books upon rectal diseases in which these tubes are described and recommended.

In 1895, Kelly, of Johns Hopkins Hospital, introduced to the profession a set of rectal and sigmoidal tubes of different calibers and lengths, designed for examining the rectum and sigmoid flexure. There were no curves to these instruments (Fig. 67). The inventor

showed, if not for the first time, at least more forcibly, that a straight instrument could be introduced through the anus into the sigmoid and up to the descending colon. Not only was this principle illustrated,



FIG. 66.—MATHEWS'S RECTAL SPECULUM.



FIG. 67.—KELLY'S PROCTOSCOPE.

but the application of the ballooning of the rectum by atmospheric pressure was brought into prominence as an adjunct in the use of tubular specula.

Marion Sims, in 1845, demonstrated to the world the advantages of atmospheric pressure in ballooning the vagina. Van Buren, in 1870, demonstrated to his class in Bellevue Hospital the application of this method to the rectum; at the same time he gave credit to Dr. Sims for the discovery. Allingham advised the use of this method and devised a tube for it; he also accords to Dr. Sims the honor of priority. But none of these authors had undertaken the scope of examination which Kelly introduced, nor had any of them used in this way the cylindrical tubes, either short or long. To Kelly, therefore, belongs not the invention of a tube, still less the discovery of the inflating power of atmospheric pressure, but simply their practical and ingenious application to rectal surgery. He popularized the method, one may say, or at least showed us its possibilities. His method is given in his own words: "Anæsthesia is unnecessary in using most of the specula which are of small caliber, and none of the various manipulations are painful. The patient kneels on an ordinary table (a common kitchen table is quite convenient) with the elbows spread out at the sides so as to bring the chest as close to the table as possible, while the thighs are perpendicular to it, supporting the pelvis as high as possible. The buttocks are drawn apart, and the blunt end of the obturator is laid on the anus, which is coated with vaseline. The direction of introduction should be at first downward and forward, and when the sphincter is well passed, up under the sacral promontory. The moment the speculum clears the sphincter area, and the obturator is withdrawn, the air rushes in audibly and distends the bowel. The bowel is illuminated in the following manner: a strong light—daylight will answer, but an electric light is most convenient—is held close to the sacrum where a head-mirror directs the rays through the tube into the bowel." He recommends as a practical set of these instruments (Fig. 68) sufficient for all ordinary purposes, a short proctoscope 14 centimeters ($5\frac{1}{2}$ inches) long and 22 millimeters ($\frac{7}{8}$ of an inch) in diameter; a long proctoscope of 20 centimeters ($7\frac{7}{8}$ inches), and a sigmoidoscope of 35 centimeters ($13\frac{3}{4}$ inches), all being of the same diameter.

For examining the extreme lower end of the anus, a proctoscope of 5 centimeters (2 inches) or less will be found convenient, and for treatment and operations in the rectum, tubes of various diameters will be needed. Long applicators or dressing-forceps, specially devised for use through these tubes, are necessary to wipe away mucus and adherent fecal masses which obstruct the view. A curette or scoop (Figs. 69, 70), devised by Kelly, is very useful for removing fecal masses and curet-



FIG. 68.—KELLY'S SET OF INSTRUMENTS FOR EXAMINING THE RECTUM AND SIGMOID.
a, sponge-holder; *b*, applicator; *c*, eurette; *d*, anal dilator; *e*, anoscope; *f*, *g*, proctoscopes;
h, sigmoidoscope.

ting small ulcerated areas, as well as for obtaining specimens of neoplasms for microscopic examination. Along with this set of instruments Kelly introduced a conical sphincter dilator (Fig. 71). It is a

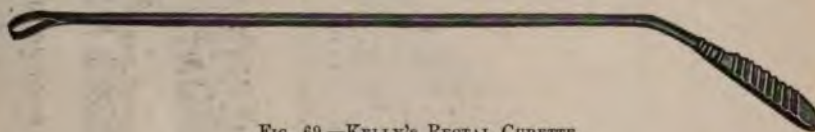


FIG. 69.—KELLY'S RECTAL CURETTE.

useful instrument, although not a necessary one. Kelly's description of the use of the long sigmoidoscope is rather enthusiastic. He says: "Upon introducing the sigmoidoscope, the longest speculum, the instru-

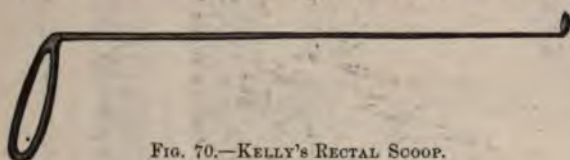


FIG. 70.—KELLY'S RECTAL SCOOP.

ment is continued up into the dilated sigmoid flexure in the false pelvis by turning the handle to the right. At

some point in the passage the atmospheric distention ceases, and the lumen of the bowel can then only be shown farther by cautiously pushing the end of the instrument on through the lax, collapsed folds."

From this one would judge that there was little or no difficulty in passing from the rectum into the sigmoid flexure, even with the obturator of the instrument withdrawn; but such a statement is unintentionally misleading.



FIG. 71.—KELLY'S SPHINCTER DILATOR.

Where the sphincter is relaxed, the coccyx movable, and the angle of flexure between the sigmoid and the rectum is not acute, the straight instrument may be introduced into the sigmoid flexure with comparative ease; especially is this true in women. But where the opposite conditions exist, where there is spasm at the recto-sigmoidal juncture, or where the sigmoid is bound down in the pelvis, this introduction is not only difficult, but extremely painful and dangerous as well. When the gut is well distended the instrument may be so directed as not to impinge upon the walls; but unfortunately this distention from atmospheric pressure ceases ordinarily in the first loop of the sigmoid, and from this point upward the edges of the tube scrape against the walls of the gut and frequently wound them.

Anæsthesia is advised by some for making such examinations; the author, however, is opposed to this, believing that the sensations of the patient are the safest guide as to how much pressure shall be used

in order to avoid injury to the parts. Moreover, there have been noticed occasionally, after sigmoidoscopy under chloroform, a temporary paralysis of peristaltic action and great difficulty in reestablishing the regular faecal movements. The exact pathology of this condition can not be stated, but it is one of those complications which may follow the use of these instruments.

In order to overcome the difficulty of passing the straight instrument around the promontory of the sacrum, the author devised a modification of the Kelly tube, which consists in the introduction of a flexible obturator by which the instrument is given a Mercier curve (Fig. 72).

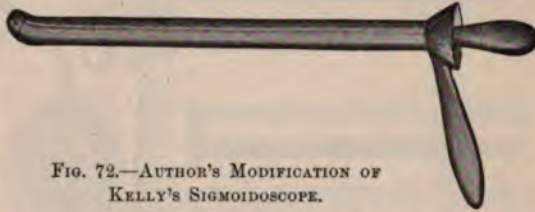


FIG. 72.—AUTHOR'S MODIFICATION OF KELLY'S SIGMOIDOSCOPE.

By this an inclined plane comes in contact with the promontory of the sacrum, and one is able to pass this point more easily and with less pain than with the straight instrument. The modification is only useful in the longer instruments necessary for examining the sigmoid.

Martin has devised a modification of the obturator in the Kelly tubes, which consists in the introduction of certain grooves through which ointments may be applied to the inside of the rectum. This obturator is also perforated, so that one may inject air or fluids into the bowel while the speculum is in position. Beach has also modified the instrument by carrying an electric light to its inner end through a supplementary tube, a principle employed in the endoscope and cystoscope. The successful use of all these instruments, however, depends upon atmospheric dilatation of the rectum and sigmoid. The patient must be placed in the uncomfortable knee-chest posture, and even in this position cases will occasionally be seen in which the atmospheric pressure will fail to balloon the parts. In the majority of cases this ballooning ceases in the first loop of the sigmoid, and nothing more can be seen above this area than that portion of the mucous membrane which collapses over the open end of the instrument. The author has found in a number of cases, in which there had been chronic proctitis or attacks of pelvic cellulitis with adhesions of the uterus and ovaries to the rectum, that the latter organ did not balloon, and examination by these tubes was very unsatisfactory. Such difficulties have led to the development of artificial means for distending the rectum.

Pneumatic Proctoscopy.—In 1890, Dr. Franz Heuel, after having experimented with his inflating endoscope, also made an attempt to

introduce the principle into proctoscopy. This is referred to in order to give credit to the man who first attempted practical pneumatic proctoscopy, although this instrument was of little value.

In 1899, Pennington, of Chicago, introduced an instrument known as his pneumatic proctoscope. This apparatus consists in a tube closed by an accurately fitting glass cap, so that the rectum can be distended by air pumped into it from a hand-bulb. The light is reflected through the glass into the rectum. This method of illumination, however, is not satisfactory on account of refraction by the glass plate.

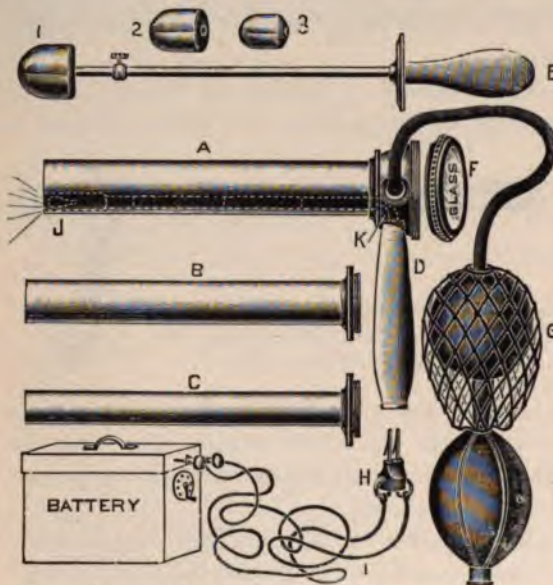


FIG. 73.—Laws's PNEUMATIC PROCTOSCOPE.

E, 1, 2, 3, obturators; A, B, C, tubes of different sizes; D, handle; F, cap with glass window; G, inflating bulb; H, battery connection; J, K, electric light and insulating rods.

Working at the same time, and upon independent lines, Laws, of Philadelphia, devised an instrument similar in many respects to that of Pennington, but which is an improvement in that the illumination is secured by an electric light carried into the inside of the tube by insulated rods (Figs. 73, 74). By this means the whole cavity is well lighted. This instrument was a great improvement on any hitherto de-

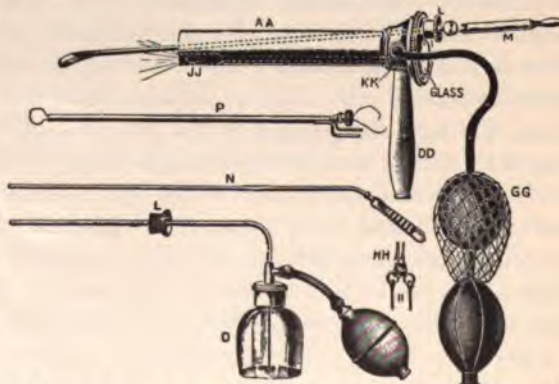


FIG. 74.—Laws's PROCTOSCOPE WITH APERTURE IN WINDOW FOR THERAPEUTIC APPLICATIONS.

M, curette; N, palpator; O, spray; P, wire snare.

vised, but certain features in it detracted from its usefulness. The cap which closes the instrument is attached by a screw-thread which sometimes binds, and thus necessitates uncomfortable manipulation of the instrument in adjusting it; the electric light occupies a considerable portion of the caliber of the tube and thus obstructs the vision to some extent. If there is much secretion or faecal matter in the bowel, this is liable to flow down over the end of the light and obscure it, thus requiring its removal and cleansing before the examination can be continued; this is tedious and annoying, and often results in the breaking of the lamp. These objections are not vital. They are overcome by a modification of the instrument devised for the author by the Electro-Surgical Instrument Company, of Rochester (Fig. 75).

Author's Pneumatic Proctoscope.—This instrument is composed of a large cylinder (*F*), into one part of the circumference of which is fitted a small metallic tube closed by a flint-glass bulb at its distal end. The electric lamp (*G*) is fitted upon a long metallic stem, and carried through the small cylinder to the end of the instrument, as is shown in the illustration.

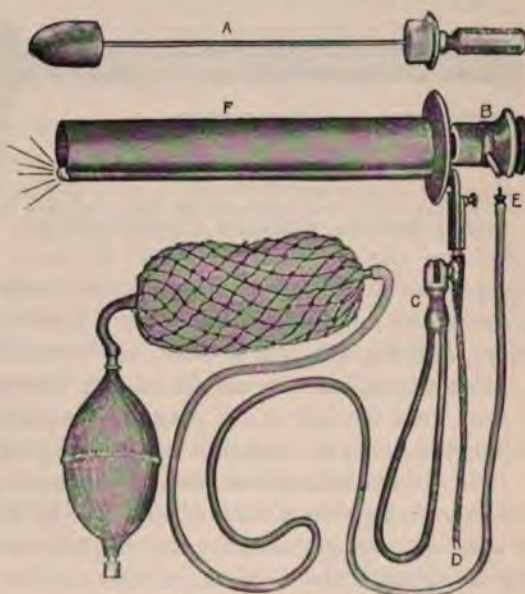


FIG. 75.—TUTTLE'S PNEUMATIC PROCTOSCOPE.

The proctoscope is introduced through the anus with the obturator

(*A*) in position. As soon as the internal sphincter is passed, this obturator is withdrawn and the bayonet-fitting plug (*B*), which contains either a plain glass window or a lens focused to the length of the instrument to be used, is inserted in the proximal end of the instrument. This plug is ground to fit air-tight, and thus closes the instrument perfectly. The plug being inserted in the tube, a very slight pressure upon the hand-bulb will cause inflation of the rectal ampulla to such an extent that the whole rectum can be observed and the instrument can be carried up to the promontory of the sacrum without coming in

A, obturator; *B*, plug with glass window closing end of tube; *C*, handle; *D*, cords connecting instrument with battery; *E*, inflating apparatus; *F*, main tube of proctoscope.

contact with the rectal wall. Further dilatation will show the direction of the canal leading into the sigmoid, and by a little care in manipulating the instrument and keeping the gut well dilated in advance, it can be carried up into this portion of the intestine without the least traumatism of the parts. If any faecal material obscures the light by being massed or smeared over the glass bulb the plug can be removed, and a pledget of cotton, introduced with a long dressing-forceps, will wipe this off so that the plug can be reintroduced and the examination continued with very slight delay or inconvenience.

The adjustable handle (*C*) fits on the rim of the instrument and thus converts it into a Kelly tube. This instrument is operated with

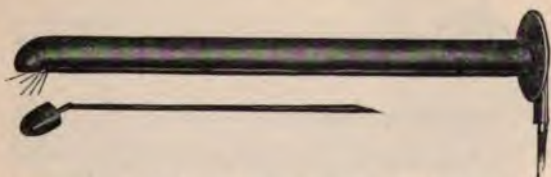


FIG. 76.—TUTTLE'S LONG SIGMOIDOSCOPE WITH FLEXIBLE OBTURATOR GIVING THE INSTRUMENT THE MERCIER CURVE.

an ordinary dry battery of four cells. It is better, however, to have one with six cells, as it will not require being recharged so frequently.

The tubes are made of various lengths, from 4 to 14 inches. The very long ones are supplied with the flexible obturator, which gives them the Mercier curve (Fig. 76), like that in the author's modification of the Kelly tubes.

For the beginner in the use of this instrument it is better to have a plain glass window in the plug, for magnifying lenses are very likely to mislead him with regard to the pathological conditions.

The 4-inch instrument enables one to examine the entire rectum, but does not give any view of the sigmoid flexure. The 10-inch tube is sufficient for any ordinary examination of the rectum and sigmoid, but one should also have the 4-inch size for convenience. The very long tubes are very rarely called for, but they are useful in large individuals with long sigmoids or loose mesocolons which may possibly allow the instrument to enter into the descending colon.

With this instrument it is possible to see all of the sigmoid flexure, and possibly even to enter the descending colon by very careful manipulation. Ordinarily it does not require any anæsthesia. It can be used in the prone or Sims's position, and the view which it gives is incomparably beyond that obtained by any other means.

In using it one must remember that the bright electric light intensifies the coloring of the parts, and may lead to false conclusions. Until one becomes familiar with the changes in appearance produced by such a light, it is better to make separate examinations by reflected daylight so as to avoid this.

Usually it is perfectly feasible to pass these tubes into the sigmoid flexure without introducing the obturator. The pneumatic pressure produced by the hand-bulb straightens out this organ, causes it to rise up above the pelvic brim, and thus facilitates the introduction of the straight instrument, and at the same time allows one to see considerably beyond the end of the latter.

It may be suggested that there is danger of rupturing a weakened and inflamed intestine by such distention, but as a matter of fact it is never so great as to produce any such effect. Whenever the pressure assumes any force the air will escape through the sphincter or the plug will slip out. In cases of relaxed sphincter it is necessary to apply a collar of wet cotton or gauze around the tube, and press it firmly against the anus in order to retain sufficient air to obtain ballooning and thus permit the examination. One precaution should not be omitted, and that is, when one has finished his examination with this instrument he should remove the cap and allow the air to escape from the sigmoid and rectum before he withdraws the tube.

Laws's instrument is supplied with a supplementary cap, through which an applicator can be introduced and medicines applied to any given point. A curette for scraping ulcers or neoplasms may be used through this aperture. The author has found it more satisfactory, however, to locate the pathological condition which is to be treated right over the end of the tube, remove the cap, and then treat it. In this way there is more room for the use of instruments, and one can withdraw and reintroduce them at pleasure.

When the examination is prolonged, condensation of moisture upon the glass may also obscure the view. To avoid this it is well to heat the glass by dipping it in hot water before the cap is screwed on. The examination of the rectum according to this method is practically painless. The Sims's position is employed and is not uncomfortable, and the results give the utmost satisfaction. These instruments serve all the purposes of the Kelly tubes, and the general practitioner needs only the one set.

Atmospheric pressure in examinations of the rectum has been made use of by Carpenter, of Kentucky, in connection with a duckbill speculum and a long rectal retractor; and by Martin, who describes a method of distending the anus with the index fingers so that the air rushes in and dilates the rectum, thus affording a good view of the parts. These methods are ingenious, but they are not to be compared with those described above.

The Limit of Ocular Examination.—The extent of the intestinal canal which can be seen through the rectum has greatly increased by these modern methods of examination. Reference has been made to

the *possibility* of examining the descending colon. For a long time the author was under the impression that he had been able to do this, but numerous experiments made upon the cadaver convinced him that this was practically impossible. Abbott, of Minneapolis (American Gynec. and Obstet. Jour., July, 1900, p. 20), has duplicated these experiments and arrived at the same conclusions.

According to his measurements a straight tube passed farther than 12 inches would impinge against the liver or diaphragm. There is no doubt that he is correct in the statement that a 12-inch, ordinary Kelly tube is as long an instrument as is ever necessary. With a pneumatic proctoscope of this length, however, one may examine the entire sigmoid flexure, and very occasionally where the mesentery of the descending colon is very long, may possibly see into this portion of the intestine. In the large majority of instances, however, the field of ocular examination is limited to the sigmoid flexure.

Probes.—The ordinary little silver probe, 4 to 5 inches long and rounded at both ends, is practically useless in examination of the rectum. These instruments should be 8 or 10 inches long, and furnished with a handle flattened and roughened on one side so that it can be manipulated with ease, and the operator can always tell in which

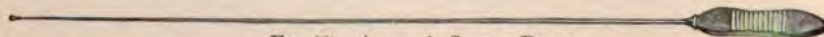


FIG. 77.—AUTHOR'S SILVER PROBE.

direction the end is pointing (Fig. 77). They should be made of pure silver in order that they may be bent in all directions throughout their entire length without danger of breaking.

As an instrument to locate the internal openings of fistulæ the author has practically discarded the probe until the patient has been anesthetized, for one can do this quite as well by digital touch and with much less pain. After the patient has been anesthetized the instrument is of great value in following the tortuous course of the fistulous tracts as they pass through the cellular and muscular tissues about the anus to reach the rectum. A very fine probe made of pure silver is often useful in internal blind fistulæ, and especially in determining diseases of the crypts of Morgagni.

Rectal Scoops.—Another instrument which is of great use and should be possessed by every operator upon rectal diseases is that known as

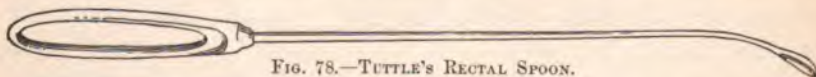


FIG. 78.—TUTTLE'S RECTAL SPOON.

the rectal scoop. That of Kelly is made of hard steel, is sharp, and can not be bent. The smaller scoop (Fig. 78), made of soft copper,

is the one which the author most frequently uses to scrape off hard faecal masses, cleanse the crypts of Morgagni, or curette ulcers.

Applicators and Dressing-forceps.—Applicators and dressing-forceps are necessary instruments in rectal examinations. They should be long enough to reach through the proctoscope and cleanse the field of observation. One should have a number of applicators so it will not be necessary for him to stop and reapply the cotton as he proceeds in his examination; they should not have roughened ends or screws. By a little care and manual dexterity one can apply cotton on a perfectly smooth wire so that it will not slip off, but can be removed without difficulty.

These instruments should be of different lengths, as the very long ones necessary for the sigmoidal tubes are not convenient to use in the

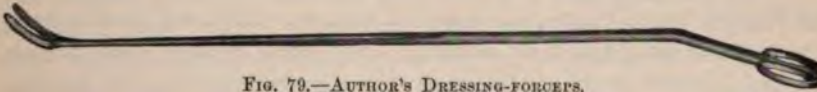


FIG. 79.—AUTHOR'S DRESSING-FORCEPS.

shorter instruments. Long, straight dressing-forceps (Fig. 79), with handles slightly bent downward so that the hand will not obscure the view, is the most useful form.

In addition to this one should also have a pair of long alligator forceps (Fig. 80) by which he can reach and seize small foreign bodies, polypi, or villous growths for the purpose of removal or examination. These forceps are useful because they can be opened and shut in a much smaller space than those in which the joint is in the middle of the shaft.

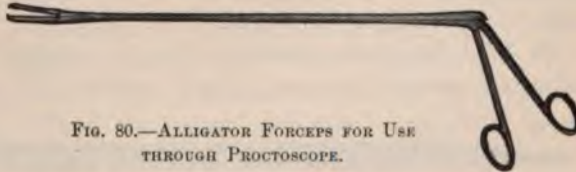


FIG. 80.—ALLIGATOR FORCEPS FOR USE THROUGH PROCTOSCOPE.

Tenacula and fixation forceps are also necessary in the examination of the rectum. The double-spring tenaculum of Burns, to catch the rectum and draw it downward, might sometimes be very useful. The advantages of such an instrument would principally be to obtain specimens for microscopic examination. Sponge-holders are practically superseded at the present day by the dressing-forceps or applicators.

Blunt Hooks.—There are a number of varieties of these of different shapes and sizes useful for the examination of the crypts, pockets, valves, and internal blind fistulæ of the rectum. By having these instruments one is able to save considerable time and trouble in bending and twisting his probes to the proper shape; but their possession

is not a necessity, for a pure silver probe can be turned into a blunt hook of any angle in a moment's time.

Bougies and Sounds.—Before the days of tubular specula bougies and sounds were made much use of to examine by the sense of touch those portions of the rectum above the reach of the finger. At present they are not so much used for this purpose, although some surgeons still adhere to them as diagnostic means. They are of great use in the treatment of strictures, certain forms of prolapse, and catarrhal conditions of the sigmoid flexure, but of comparatively little value in diagnosis. They are made of various forms, sizes, and materials. They are conical, cylindrical, and fashioned after the urethral bougie à boule. In general it may be stated that hard, stiff rectal bougies are very dangerous instruments, and should never be used above the lower 4 inches, if indeed they have any place at all in rectal surgery. The old English rectal bougie was made of web and shellaced, thus making a smooth surface, which by soaking in hot water became more or less flexible. It was more useful than the hard-rubber bougies on this account, and until the introduction of the Wales instrument was the one most generally used. These instruments were made conical and cylindrical. At one time it was quite the fad in England for people suffering from constipation to go by certain offices on their way to business and have these instruments passed.

Other rectal sounds are made of metal and vertebrated so that they bend in all directions. The objections to such instruments are that the joints become rusty, they lose their flexibility, and they are very liable to break off in the rectum.

In 1883 Dr. Wales introduced to the medical profession a modified rectal bougie composed of soft rubber. He describes it as fol-



FIG. 81.—WALES'S SOFT-RUBBER RECTAL BOUGIE.

lows: "A conduit runs through the center and terminates in the point of the bougie for the purpose of commanding a stream of water that might be required at any moment to facilitate the introduction of the instruments. The points of the bougies are made in various shapes—spherical, conical, and olivary—with the view of meeting the necessities of special cases. The surface is perfectly polished, which, by reducing friction, increases the facility of introduction and eliminates the unpleasant sensation of dragging caused by a rough instrument" (Medical Chronicle, Baltimore, 1883). Some of these instruments are made with a sort of bell-shaped concavity with sharp edges in the olivary tips. This is very objectionable, and in selecting

a set it is advisable to avoid these. A conical is better than an olivary end (Fig. 81). These instruments are introduced by thoroughly lubricating them, and passing them gently upward until an obstruction is met.

An ordinary Davidson bulb syringe is then attached to the instrument, and a stream of water is carried through in order to push out of the way any folds of mucous membrane or masses of faecal matter which may obstruct its passage. In this manner the rectum is dilated by the fluid, and the bougie will pass unobstructed to the promontory of the sacrum if there be no stricture to prevent it. At this point some little pressure is necessary, and the stream of water should be persistently carried through in order to pass this flexure. After the instrument has once entered the sigmoid flexure the force of the stream will lift the folds of mucous membrane from in front of it, and it will pass without difficulty into the gut. If it is long enough and quite flexible, it may be even passed into the descending colon. These are by all means the most satisfactory rectal bougies, both for the general practitioner and for the specialist. They are made in different sizes, being numbered from 1 to 12. The smaller sizes are excellent instruments to give high enemata or rectal lavage. Wales also introduced with this bougie a thin rubber cap or sheath, which he used as a dilator for strictures after the instrument had passed through the same. This sheath was tied to the bougie, and air or water was pumped into it until it dilated two or three sizes above that of the bougie, thus stretching the stricture by a soft and elastic pressure. The ordinary Wales bougie is about 12 inches long. This is not sufficient to reach and enter the descending colon. The author is not aware that Wales ever recommended their being made any longer; but Wyeth, of New York city, has had made for him a set of these instruments 26 inches long, including the sizes 6 to 10. These long instruments may be used with great satisfaction in diseases of the sigmoid flexure and descending colon, and are a most desirable addition to our armamentarium.

The rectal bougie *à boule* (Fig. 82) is a very useful instrument to determine the length or extent of a stricture. After the latter has once been established and the size of the opening in it has been determined,

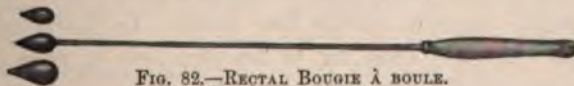


FIG. 82.—RECTAL BOUGIE À BOULE.

these little acorn-shaped bougies may be passed through it, and upon withdrawal, owing to their obtuse base, will catch and thus more or less accurately show the height to which the contracture extends. They are made of hard rubber or flexible wire, with different sized tips which can be screwed on according to the case in which they are to be used.

The stem is very flexible and can be bent in any direction. They are best used through a cylindrical speculum. The latter is passed up to the stricture, the bougie *à boule* is carried through it and then through the stricture. By this means it is possible to see accurately the opening into the stricture and avoid any undue manipulation and force in the introduction of the bulbous bougie into it. Andrews, of Chicago, has devised an instrument of this kind made upon an inflexible stem, and bent so as to conform to what he considered the normal curve of the rectum, but this form of instrument does not seem equal to the other.

In some cases local examination fails to determine the nature and cause of rectal disease. The condition may be above the point of examination, or the manifestations may be so obscure that it is impossible to determine their exact pathology. In neoplasms, one should always remove a specimen for microscopic examination before finally deciding upon their malignancy. In other obscure conditions, a careful analysis of the discharges and of the fecal contents of the bowels is necessary.

Examination of Fæces.*—Examination of the fæces is accomplished by four methods:

Macroscopical, Microscopical, Bacteriological, and Chemical.

Fæces are the materials discharged from the bowels, made up in greater part of the remains of food after the process of digestion. Associated with these remains are fluids secreted from the digestive tract, desquamated epithelial cells, bacteria in large numbers, and occasionally fortuitous substances, such as parasites and their ova, blood, pus, gall-stones, etc.

In health from 140 to 200 grammes per day are discharged by an adult. Though varying within wide limits, they are usually of a light-brown color. Certain foods and medicaments may cause them to become very dark or even black, as after the ingestion of huckleberries or iron. Again, when the flow of bile is impeded they may become light yellow or gray. In certain forms of enteritis, as in typhoid or cholera, they may become gray or green.

Commonly the evacuations take place once every twenty-four hours, but it is not uncommon to find persons in perfect health whose evacuations occur but once in forty-eight hours, and again others whose habit it is to evacuate twice in twenty-four hours. In pathological states these intervals may vary from ten to fourteen days or more on the one extreme, to intervals of a few minutes on the other.

In a healthy individual the fæces are of a pasty or dough-like consistence, and are molded to the shape of the bowel, sometimes as long, sausage-shaped segments or a series of boluses closely massed together.

* For this section the author is indebted to Dr. F. M. Jeffries, director of the New York Polyclinic Laboratory.

Disturbances of digestion quickly alter this consistence from the hard, dry masses of constipation and the dry, clay-like stools of liver disturbances to the fluid and watery stools of a simple enteritis, or of the graver disturbances, such as typhoid or cholera.

In addition to the observations as to color and consistence many constituents may be observed macroscopically. Blood or pus in large quantities may be recognized as such; seeds of fruits and vegetables appear unchanged, and in the lenteric states all kinds of food pass through wholly unaffected. The writer once had submitted to him for examination a pint or more of bodies about the size of hickory nuts which a patient was said to be passing regularly, and which proved on examination to be halves of orange segments sans mastication, sans digestion. The writer has also seen pills and even compressed tablets appear unaffected in the dejecta.

Skins and seeds of fruits and vegetables, as of apples and tomatoes, usually are readily recognizable, as also are shreds of vegetable fibers.

Enteroliths, which are gall-stones, may sometimes be found, and are of a considerable degree of importance as an aid to diagnosis. They may readily be overlooked, as they are frequently soft and of a clay-like consistence; but a chemical and microscopical examination will determine their character.

Mucus, which normally serves to coat the *fæces* when properly formed, may sometimes become greatly increased and constitute a conspicuous part of the stools. In cases of mucous colitis the greater part of each movement may be made up of mucus, and frequently it fairly forms a mold of the intestine and is passed as long strands of a structureless, more or less tough, whitish mass. Osler reports an autopsy where such a condition existed, and says that the intestine was lined as with a membrane, and that upon its removal the mucosa appeared to be uninjured.

In ulcerations of the intestine the stools may occasionally contain fragments of intestinal mucosa.

From their characteristics the stools of various diseases have received names suggested by their appearance, as, for example, pea soup in typhoid, rice-water in cholera, and tarry in yellow fever.

The characteristic odor of normal *fæces* is due to the decomposition of the food residue and to the secretion of glands about the anus. This odor varies in part according to the nature of the food ingested. In some diseased conditions it becomes very pronounced and disagreeable, and is largely due to micro-organisms. Pure cultures of some of these micro-organisms impart an odor which is readily recognized as contributing to the *fæcal* odor.

Parasites and parts of parasites, many of which are recognizable by the unaided eye, are common constituents of the dejecta. They comprise a not inconsiderable group, and, according to the literature, the list continues to grow.

It is not within the province of this article to describe the various forms occurring in fæces, but they will simply be enumerated in the order as classified by Von Jaksch:

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| 1. Protozoa | <table border="0"> <tr> <td>Rhizopoda</td> <td>{</td> <td>Monadines.</td> </tr> <tr> <td></td> <td>{</td> <td>Amœba coli.</td> </tr> <tr> <td>Sporozoa</td> <td>{</td> <td>Represented by coccidia.</td> </tr> <tr> <td></td> <td>{</td> <td>Cercomonas intestinalis.</td> </tr> <tr> <td>Infusoria</td> <td>{</td> <td>Megastoma entericum.</td> </tr> <tr> <td></td> <td>{</td> <td>Trichomonas intestinalis.</td> </tr> <tr> <td></td> <td>{</td> <td>Paramœcium coli.</td> </tr> </table> | Rhizopoda | { | Monadines. | | { | Amœba coli. | Sporozoa | { | Represented by coccidia. | | { | Cercomonas intestinalis. | Infusoria | { | Megastoma entericum. | | { | Trichomonas intestinalis. | | { | Paramœcium coli. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rhizopoda | { | Monadines. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | { | Amœba coli. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sporozoa | { | Represented by coccidia. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | { | Cercomonas intestinalis. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Infusoria | { | Megastoma entericum. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | { | Trichomonas intestinalis. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | { | Paramœcium coli. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2. Vermes. | <table border="0"> <tr> <td>Platoda</td> <td>{</td> <td>Cestoda.....</td> <td> <table border="0"> <tr><td>Tœnia solium.</td></tr> <tr><td>Tœnia saginata.</td></tr> <tr><td>Tœnia nana.</td></tr> <tr><td>Tœnia diminuta.</td></tr> <tr><td>Tœnia cucumerina.</td></tr> <tr><td>Bothriocephalus latus.</td></tr> <tr><td>Distoma hepaticum.</td></tr> <tr><td>Distoma lanceolatum.</td></tr> </table> </td> </tr> <tr> <td></td> <td>{</td> <td>Trematoda.....</td> <td> <table border="0"> <tr><td>Distoma Rathouisi.</td></tr> <tr><td>Distoma sinense.</td></tr> <tr><td>Distoma felineum.</td></tr> <tr><td>Ascaris lumbricoides.</td></tr> <tr><td>Ascaris mystax.</td></tr> <tr><td>Oxyuris vermicularis.</td></tr> <tr><td>Anchylostoma duodenale.</td></tr> <tr><td>Trichocephalus dispar.</td></tr> <tr><td>Trichina spiralis.</td></tr> </table> </td> </tr> <tr> <td>Annelida,
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| Tœnia saginata. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tœnia nana. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tœnia diminuta. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tœnia cucumerina. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bothriocephalus latus. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Distoma hepaticum. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Distoma lanceolatum. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | { | Trematoda..... | <table border="0"> <tr><td>Distoma Rathouisi.</td></tr> <tr><td>Distoma sinense.</td></tr> <tr><td>Distoma felineum.</td></tr> <tr><td>Ascaris lumbricoides.</td></tr> <tr><td>Ascaris mystax.</td></tr> <tr><td>Oxyuris vermicularis.</td></tr> <tr><td>Anchylostoma duodenale.</td></tr> <tr><td>Trichocephalus dispar.</td></tr> <tr><td>Trichina spiralis.</td></tr> </table> | Distoma Rathouisi. | Distoma sinense. | Distoma felineum. | Ascaris lumbricoides. | Ascaris mystax. | Oxyuris vermicularis. | Anchylostoma duodenale. | Trichocephalus dispar. | Trichina spiralis. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Distoma Rathouisi. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Distoma sinense. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Distoma felineum. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ascaris lumbricoides. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ascaris mystax. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Oxyuris vermicularis. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Anchylostoma duodenale. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | { | Rhabdonema | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | { | Strongyloides | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | Anguillula intestinalis. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3. Insects. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

The microscopical characters of the fæces are easily determined. In proceeding to examine under the microscope, the material is spread out in a thin layer underneath a cover-glass and examined with low powers as with $\frac{3}{8}$ and $\frac{1}{4}$ inch objectives. It may be necessary to dilute them with water or a 3-per-cent salt solution before they are in a condition for microscopical examination. The substances derived from the food are first to be considered.

1. Vegetable cells unaltered or in various stages of disintegration—isolated or grouped as developed, some containing chlorophyll but most devoid of it.

2. Muscle fibers recognizable by their structure but appearing swollen and stained yellow.

3. Fat and oil globules.

4. Starch granules, hydrated and sometimes unhydrated. They may be recognized by their blue color when treated with a weak iodo-potassium-iodide solution.

5. Fibrous tissue of white fibrous and yellow elastic varieties.

6. Detritus. Granules large or small, grouped or isolated, pale or dark in color.

7. Always associated with these are bacteria, which are abundant and of numerous varieties, prominent among which are the *Bacillus coli commune* and the *Bacillus proteus vulgaris*. None of the bacteria normally found are of pathogenic character, although they may exhibit pathogenicity at times.

8. Molds and yeast fungi are frequently associated with the bacterial flora.

In pathological states the bacteria may increase to an enormous amount and the feces may contain pathogenic bacteria, as the typhoid bacillus in typhoid fever, the comma bacillus in Asiatic cholera. Tubercle bacilli may be found in cases of tubercular ulcerations.

The detection of the pathogenic bacteria is not a simple procedure, and should be left to the bacteriologist.

9. From the intestinal tract itself epithelial cells are constantly shed. They may appear normal or in all stages of disintegration, according to the length of time they have constituted a part of the stools. They are, as a rule, stained yellow.

By far the most important microscopical elements of the feces are the animal parasites. Some of these are microscopical, and others have ova which would escape detection without microscopical examination.

Amœbi coli, which belongs to the rhizopoda, is found in certain dysenteric stools, and occurs usually in tropical or subtropical regions. It can not be distinguished from the *Proteus amœba*, so common in the waters of all localities. It is merely a mass of protoplasm devoid of a cell-membrane, possesses a nucleus and one or more vacuoles. The protoplasm is granular, and frequently contains cells and granules of detritus which it has devoured. It exhibits the same motility noticeable in its prototype, the *Proteus amœba*. It may be as small as a leucocyte, or so large as nearly to fill a field of a $\frac{1}{4}$ -inch objective. In cases where its presence is suspected the stools should be examined perfectly fresh and should be kept warm. In selecting material for such examination, gather up the particles of viscous or jelly-like material. Such stools may be kept on hand for future examinations if a little carbonate of soda be added and they be kept at about the body temperature.

A variety of crystals may occasionally be seen in the feces.

Fatty acids are found in the form of minute, short, slightly curved, colorless crystals. They are soluble in ether.

The fatty crystals have been found in abundance in alcoholic stools and the stools of jaundice, especially in children. They are abundant in the stools of infants during lactation.

Fatty soaps, which occur in long, colorless, needle-like crystals arranged in stellate groups, may be seen. They are not soluble in ether.

Hæmatoidin crystals, usually somewhat atypical in structure, of a light-brown color, resembling somewhat an irregular sheaf of wheat, may be found free or enclosed in globular masses of a substance resembling mucin. They have been observed in cases of chronic intestinal catarrh, as the result of hæmorrhage, and also in cases of nephritis.

Charcot-Leyden crystals are sometimes found in fæces as in ankylostomiasis. They are colorless and are octahedral in form, resembling those in semen and the sputum of asthmatics. They have been found in a variety of conditions, and by their almost constant appearance in conjunction with the various entozoa, their presence may be considered as pointing to an infection by some form of intestinal parasite.

Cholesterin is a normal constituent of the fæces, but its appearance in crystalline form is unusual. It occurs in the form of irregular rhombic plates which frequently appear in groups. They are colorless, thin, highly refractive, and are soluble in ether. When treated with dilute sulphuric acid and tincture of iodine they give a characteristic reaction of a violet color followed by blue, green, and red. No diagnostic importance can be attributed to these crystals.

Phosphate of calcium in the stools appears either as wedge-shaped, colorless bodies in groups, with converging apices, or yellowish, round, dumb-bell or oval bodies, which are usually fissured. Their occurrence is rare and of no clinical value.

Calcium oxalate crystals, in the pyramidal form common to urine sediments, frequently appear in the fæces in health or disease. They are in more abundance during a vegetable diet.

Triple phosphate crystals (ammonio-magnesium-phosphate) are common to fluid stools. They are usually in the form designated as the coffin-lid, and are found only in alkaline stools. They are readily soluble in acetic acid.

Sulphide-of-bismuth crystals are found in the stools after the administration of some form of bismuth. They resemble hæmin crystals, and are dark brown or black rhombic bodies.

Bacteriological Examination.—As previously stated, the bacteriological examination belongs to the expert bacteriologist.

The organisms found even in healthy stools are numerous and diversified, and in many of the inflammatory conditions no new forms have been discovered. In catarrhal and diarrhœal stools the bacteriological flora is extensive. It would appear that these conditions are not attributable to any one organism or group of organisms. A germ to be an etiological factor need not at autopsy be found to have invaded the connective tissues; the bacteria may produce their effect solely

through their poisonous products. Among those mentioned as having been etiological factors are streptococcus, staphylococcus, *Bacillus pyocyaneus*, *Bacillus lactis aerogenes*, *Bacillus coli commune*, spirillum of Finkler and Prior.

Other bacteria are the typhoid bacillus in typhoid fever, the cholera bacillus in Asiatic cholera, the diphtheria bacillus in diphtheritic enteritis, the tetanus bacillus, the *Bacillus aerogenes capsulatus*, and the tubercle bacillus. This last organism may be discovered by the following procedure:

If the stools are fluid, smear them in a thin layer on glass slides, or if not fluid, they must be dissolved in water to a pasty consistence and then smeared as described. A number of slides should thus be prepared, as the great dilution causes the bacilli if present to be widely scattered. After allowing the smears to dry spontaneously in the atmosphere, they must be passed rather quickly three times through a Bunsen or alcohol flame to "fix" them. Then immerse them for half an hour in the following solution:

Ziehl-Neelsen's Carbol-fuchsin

Saturated alcoholic solution of fuchsin..... 10 c. c.;

Five-per-cent carbolic-acid water..... 90 c. c.

Remove from this solution, carefully wash in running water, and decolorize for about two minutes in a 5-per-cent solution of sulphuric acid. Wash in water again and counterstain for three minutes with an alcoholic solution of methylene blue. Wash finally in water, dry between folds of blotting-paper, and examine with a $\frac{1}{2}$ -inch oil immersion objective. If tubercle bacilli are present they will be contrasted by their bright-red color, as all other bacilli present will have reacted to the blue dye. It must be borne in mind that they are never present in great numbers, and that before a negative decision can be determined the investigator must have patiently searched over several preparations.

The chemical examination of the fæces is of little importance owing to the paucity of data that may be obtained thereby, or to the failure of such data to be of any clinical value.

Mucin is a constant constituent of the stools. For its detection the stools are to be dissolved in water and an equal quantity of lime-water added. After the mixture has stood for several hours it is filtered, and to the filtrate an excess of acetic acid is added. If mucin is present a turbidity or cloudiness will appear.

Albumin in the stools may be detected by mixing them with water, and after allowing the mixture to stand a short time it is filtered and the filtrate rendered acid by the addition of a small quantity of acetic

acid. This is then put in a test-tube and heated nearly to the boiling point. If albumin is present a cloudiness will appear. It is recommended that the test-tube be nearly filled and the upper portion only be heated, so that the lower unheated strata may be used for comparison.

For the detection of peptone in the stools Von Jaksch recommends the following procedure: The stools are rendered pasty by the addition of water, boiled and filtered while still hot. The filtrate is to be treated with acetate of lead to precipitate its mucin; it is then filtered again, and the filtrate, which should be not less than 500 cubic centimeters in volume, is acidulated with hydrochloric acid. To this add phosphotungstic acid until a precipitate ceases to form. The fluid is then immediately filtered. The precipitate is washed on the filter with five parts of concentrated sulphuric acid in one hundred parts of water until the fluid which passes through is colorless, to get rid of the salts. The precipitate is then washed from the filter with as little water as possible. Place in a watch-glass, add barium carbonate until the mixture is alkaline, and then place on a water-bath at the boiling point and heat for about fifteen minutes and apply the biuret test as follows: Treat with caustic potash and add, drop by drop, a 10-per-cent solution of sulphate of copper. Peptone is shown by the formation of a color ranging from bluish-red to violet, and varying in intensity according to the quantity present.

Urea is one of the normal constituents in the stools, and when it is desired to ascertain the total quantity of nitrogenous substances eliminated in questions of metabolism, it becomes necessary to estimate the urea in the stools. The method of Von Jaksch is here recommended. Before drying the stools treat them with dilute acid to prevent the evaporation of ammonia. Dissolve the dried stools in three or four times their volume of alcohol, allow this to stand twenty-four hours and filter. The precipitate is washed on the filter repeatedly with alcohol, the filtrates are mixed, and the alcohol distilled off. The residue is treated with nitric acid, and the resulting crystalline pulp allowed to stand for some hours, when the crystalline masses which have formed are pressed between folds of blotting-paper, dissolved in water, and treated with carbonate of baryta until carbonic acid ceases to form, and then dried on a water-bath. The dry residue is then extracted with boiling alcohol. On evaporation the urea remains in long, slender, prismatic crystals. The usual tests for urea may be applied to these crystals.

Of the carbohydrates in the stools, starch and sugar are the two which will be considered.

Starch, as already stated, may be recognized microscopically. To test for either starch or sugar the faeces should be boiled with the water

and the concentrated filtrate tested. For starch, use the iodo-potassic-iodide solution, when its presence will be manifested by a blue color. For sugar, use Fehling's or the phenyl-hydrazin test.

Various other substances which may be found normally or pathologically in the fæces are hardly of sufficient importance to warrant mention in this work; and, besides, their detection and estimation require skilled manipulation and elaborate laboratory facilities.

Anæsthesia in Rectal Diseases.—The patient's sensation is an important aid in the diagnosis of rectal diseases; for this reason, because of the repugnance of patients, and on account of remote but possible dangers, general anæsthesia should be avoided whenever possible. In most cases examination can be made by the finger, the speculum, the bougie, or the sigmoidoscope with very little pain, and in view of the dangers attending the use of these instruments under general anæsthesia it is better to suffer slightly than to incur risks. Furthermore, primary anæsthesia is of little use in these examinations, for the anus is almost, if not quite, the last organ to lose its sensitiveness and reflexes; therefore nothing short of complete narcosis is satisfactory. Sir William McEwen (*British Medical Journal*, 1904, vol. xi, p. 232) has called attention to the dangerous disturbances of respiration during operations on the anus and rectum caused by reflex action on the pneumogastric nerve, and says it is not safe to begin such operations until profound anæsthesia has been attained. He suggests that this danger may be avoided by local anæsthesia or hypodermic injections of morphine before etherization, but in examinations alone, if local anæsthesia of the anus can be produced, that is all that is necessary.

In the examination of hyperæsthetic patients general anæsthesia is occasionally demanded. In such cases it is advisable, if possible, to prepare the patient for any minor operation that may be necessary and do it at the same time. In office practice these operations are limited to stretching the sphincter, incising fissures or small fistulas, removing small isolated hæmorrhoids, cauterizing ulcers and ligating polypi. In such cases the inhalation of ethyl chloride or nitrous oxide gas produces complete anæsthesia, and the patients can safely walk out in half an hour afterward. The former requires no complicated apparatus for its administration, and is practically free from danger. In operating with either, a small dose of morphine should be given hypodermically about ten minutes before the anæsthetic, to quiet mental excitement and to forestall the acute pain attendant upon the rapid return of consciousness. With these drugs the surgeon should not begin operating until narcosis is complete; undue haste may excite the patient and allow a return to consciousness before anything is accomplished.

In operations consuming more than fifteen minutes ether or chloro-

form should be employed; chloroform causes less nausea, but ether is safer, and the nausea is largely prevented by the preliminary administration of ethyl chloride or gas. With these drugs the morphine may be withheld until the completion of the operation. When using chloroform the mask should always be removed during the stretching of the sphincter, as this procedure excites deep respiration and invites danger from too rapid inhalation of the drug.

Spinal anæsthesia is useful in rectal operations, but further experience is necessary to establish its exact status in surgery.

Local Anæsthesia.—In ulcers, fissures, and granulating wounds of the anus the pain of examination and treatment may be ameliorated by the insufflation of orthoform or anæsthesin upon the parts, or by the application of a strong solution (10 per cent) of cocaine. None of these remedies has any marked effect upon the unbroken skin or mucocutaneous membrane. The mucous membrane may be anæsthetized by cocaine or eucaine, applied on little pledgets of cotton to which threads are tied in order that the surplus may be removed after five minutes' contact. The other local anæsthetics have proved practically useless in rectal surgery.

All minor operations upon the rectum can be done with comparatively little pain by the hypodermic injection of weak solutions of cocaine or eucaine into the parts, or even by infiltration with cold water as advocated by Gant. Stretching the sphincter, an important part of these operations, is quite painful with such anæsthesia; Gant therefore advises cutting this muscle, which departure from recognized surgical practice we do not endorse. In the infiltration method there is danger of infection from punctures through tissues which it is impossible to sterilize, and from sloughing after operation. These methods of anæsthesia are chiefly useful in office practice, and the extent of their employment depends upon how much operating one should do and allow the patient to go out immediately thereafter. To those who believe that it is safe to tie off hæmorrhoids, to incise fissures, and to operate on fistulas, and let the patient walk about at once, such methods present a large field of usefulness. Such practices, however, appear to invite unnecessary danger, to ignore the advantages of rest in a recumbent position after all operations on the rectum, and to minimize both the operation and its moral effects. Moreover, one can do more thorough work unhampered by the restlessness of conscious, anxious patients.

CHAPTER IV

CATARRHAL DISEASES OF THE RECTUM AND SIGMOID: PROCTITIS AND SIGMOIDITIS

THE structure of the mucous membrane and the functions of the rectum and sigmoid render these organs peculiarly susceptible to catarrhal affections. Not only are they studded with myriads of Lieberkühn follicles, forming, as it were, little crypts for the lodgment of infectious materials, but it is at these points that the excrementitious matters of the alimentary canal in their most concentrated form lodge for varying periods before being passed out of the body.

The mucous membrane here absorbs from the faecal mass a large proportion of its fluids, in which are many bacteria and infectious germs. Here the faecal mass becomes hardened through this absorption of its moisture, and by friction and pressure excoriates, sometimes actually wounds the mucous membrane, and thus produces lesions that become infected and result in catarrhal proctitis.

The intimate connection and similarity of structure between the mucous membrane of the rectum, sigmoid, and colon render it impossible to discuss the disease in one part without taking into consideration the others. Moreover, inasmuch as the chief symptoms of catarrhal inflammation of the sigmoid and colon are often referred to the rectum or associated with some symptoms in this organ, it has become the province of the rectal specialist to look into and treat these diseases whether they are confined to the rectal ampulla or extend to the caput coli itself. Since the invention of the modern instruments for examining the sigmoid flexure, the direct observation and application of remedies to these parts has simplified their treatment and in many respects altered our views entirely with regard to their pathology. It is impossible in any case of catarrhal disease to draw a dividing line where the condition begins and where it ends. In the majority of cases, instead of the inflammation being confined to the rectum, it extends throughout the sigmoid flexure and upward into the descending colon. There are instances in which the disease is confined to the rectum; but it is very rare that there is a catarrhal colitis or sigmoiditis in which the rectum

is not more or less involved. In considering, therefore, the catarrhal diseases of the rectum, one can not confine himself to this organ alone, but must extend his observations higher up in the intestinal canal.

In the acute form of proctitis one may generally recognize a definite period of beginning, and come to some conclusion with regard to its origin; but the chronic forms are so insidious in their approach and so devoid of positive symptoms in their early stages that one can rarely tell how long they have existed, their cause, or their probable duration.

Catarrhal inflammation of the lower end of the intestinal tract may be divided into two broad classes, *Simple* and *Specific*.

Simple catarrhs consist in acute catarrhal inflammation, atrophic catarrhal inflammation, hypertrophic catarrhal inflammation.

The specific forms are gonorrhœal catarrhal inflammation, diphtheritic catarrhal inflammation, erysipelatous catarrhal inflammation, dysenteric catarrhal inflammation, syphilitic catarrhal inflammation.

SIMPLE CATARRHAL INFLAMMATION

Inflammations of the mucous membrane which are not due to any specific germ yet recognized are among the most frequent diseases of the human race. Especially is this true in large cities, and in those climates where the individuals are subject to frequent and excessive changes in temperature, overheated houses, poor ventilation, indulgence in stimulating and highly seasoned foods, and the lack of physical outdoor exercise.

Predisposition.—Individuals differ in their susceptibility to these inflammatory processes. Some patients live for years in certain climates, resist the sudden changes and exposure that pertain to their environments, indulge in almost all sorts of excesses with regard to diet, and never suffer from any catarrhal disorders; while others develop them on the slightest exposure or indiscretion. Sudden change of temperature, alteration in diet, indulgence in some stimulating food or drink, or even change of water, will be followed in these individuals by catarrhal inflammation of the colon and the rectum. This predisposition is undoubtedly hereditary, for it can be traced from generation to generation in families.

It is impossible to state at what point the disease most frequently begins. It may develop at either end of the large intestine, and progress steadily toward the other as long as its treatment is neglected. In adults the symptoms and history of the case may give some indication of its origin, but in children this is always too unreliable to justify conclusions upon this point. We must therefore depend largely upon

PLATE I.



NORMAL MUCOUS
MEMBRANE



ACUTE CATARRHAL
PROCTITIS



ATROPHIC CATARRHAL
PROCTITIS



HYPERTROPHIC
CATARRHAL PROCTITIS



FOLLICULAR PROCTITIS



ULCERATIVE PROCTITIS

INFLAMMATORY CONDITIONS
OF THE RECTUM AS SEEN THROUGH THE PROCTOSCOPE

local examination. Happily we can examine a child's rectum just as well as an adult's, and whenever persistent constipation, diarrhoea, or irregularity in the faecal movements of an infant are discovered, a rectal examination should be made at once. Within the last year the author has introduced the small proctoscope into the sigmoid flexures of four children under the age of two years (one being less than nine months old) without the slightest difficulty. In three of them a marked catarrhal inflammation of the lower end of the colon was found, which yielded readily to local applications, and the patients were rapidly cured. The influence of age, sex, and occupation vary in the different types of the disease, as well as the symptoms, and therefore it is advisable to discuss each variety separately.

Acute Catarrhal Proctitis.—Like catarrhal inflammation in other mucous tracts, this comes on suddenly, and may be frequently traced to a clearly defined exciting cause. It may be ushered in with a slight chill, aching pains over the body, especially in the sacrum and around the pelvis, and slight elevation of temperature. Generally, however, the patient does not observe these symptoms, but describes the disease as dating from the first sensations in the rectum.

Symptoms.—The earlier symptoms are fulness followed by a sense of weight, heat, and burning in the rectum. If the disease is high up there will be more discomfort than real pain, but tenesmus, bearing down, and desire to go to stool will be marked. Pains that radiate to the back, legs, and pelvic organs, difficulty in and a frequent desire to micturate, are noticed; the bodily temperature may be elevated, the pulse quickened, the tongue furred or coated white, and there may be headache or general malaise. The patient is always more comfortable lying down than in the erect posture.

Some describe a sensation as if a foreign body was in the rectum causing the sphincters to contract, and when the bowels move, the faecal matter, which is generally fluid, is ejected through the narrowed orifice in a small forcible stream.

If the disease be severe, leucorrhœa or cystitis may be produced in consequence of the intimate nervous, vascular and lymphatic connections; but where these occur, one should always suspect and positively eliminate the gonorrhœal element as an etiological factor before he concludes that he has to deal with a simple catarrhal proctitis. During the first twenty-four hours of acute catarrhal proctitis there will be discharged from the rectum a thin, fluid faecal matter; later on this fluid will be tinged with blood and contain mucus; if the inflammation persists and is severe, ulceration will take place; indeed, the whole mucous membrane of the rectum may slough off and be discharged. After this the discharges from the rectum will be muco-purulent or sanguino-puru-

lent, the faecal materials being mixed with blood and pus in large quantities.

From the beginning the desire to go to stool is frequent and imperative, and requires the patient to remain close to the commode. The act does not relieve the desire, and the patient constantly strains to rid himself of what seems to be a foreign body in the rectum, but which is nothing more than the inflamed, swollen, and oedematous mucous membrane. The sensation is comparable to that of granulation of the conjunctiva, where there is constant desire on the part of the patient to get rid of something in the eye. In children the mucous membrane frequently prolapses, producing the condition described by Roser as "*ectropion recti*."

The introduction of the finger or speculum is very painful, and may even require anaesthesia. To the touch the parts feel dry, hot, and swollen in the first stages; after secretion has begun they appear moist and slimy, the walls of the rectum seem close together, and the caliber diminished.

Through the speculum the membrane appears of a bright-red color (Plate I, Fig. 2), dry, and oedematous in the beginning; later on the color is darker and the surface covered with mucus; occasionally this assumes the appearance of a pseudo-membrane.

The inflammation in acute catarrhal proctitis is generally confined to the mucous membrane and the submucosa. Rarely the deeper tissues may be involved, and even the muscular wall itself may be perforated, resulting, as Kelsey has pointed out, in acute peritonitis and death. Under ordinary circumstances the inflammation subsides under rest and proper treatment, the symptoms grow less marked, and the patient recovers in a few days; at other times the disease passes into the chronic form. When nothing more than the mucous membrane is involved, this ends the acute phenomena; but when deep ulceration occurs, perirectal abscess, fistula, or stricture may result.

Etiology.—Pinworms, lumbricoids, impacted faeces, and foreign bodies may all set up a catarrhal inflammation of the rectum. Improper diet, such as sauces, highly seasoned foods, hot tamales, green peppers, etc., are frequent causes of the acute variety. Chronic constipation is not very frequently the cause of acute proctitis; this condition is slow in development, and the mucous membrane becomes accustomed to a condition which approaches by such gradual and insidious steps. Fermentation or putrefaction in the intestine, which sometimes follows a change of diet, water, and environments, may induce a sudden and acute catarrhal inflammation of the colon all along its course. This occurs more frequently in summer and in hot climates than under other conditions.

Infection is, however, the chief of causes. When the faecal mass reaches the sigmoid flexure and rectum, the moisture is largely absorbed, and the hard, insoluble substances are likely to stick out beyond it and thus irritate or wound the mucous membrane. This renders the lower portion of the bowel very liable to infection from the bacteria always present.

Rheumatism and gout are closely related to catarrhal inflammation of the intestines (Curling), but not as etiological factors. The same conditions which cause them, viz., fermentation and putrefaction in the intestinal canal, are frequently the cause of proctitis and colitis.

Prolapse and intussusception may be the cause of catarrhal inflammation. This is brought about by the friction of the membrane upon itself, the irritation from the passage of faecal masses through a narrowed channel, and a circumscribed interference with the circulation of the parts. In prolapse, where the gut protrudes and recedes from time to time, it is irritated by this process and by rubbing against the clothing; its circulation is interfered with by contraction of the sphincter, and it is desiccated by exposure to the atmosphere; as a result catarrhal inflammation frequently occurs. Tumors of the rectum, uterus, and ovaries, displacements of the uterus, stone in the bladder, and whatever causes undue and unnatural pressure upon the rectum, will cause a localized congestion at that point, and set up an inflammation which may spread in all directions. It may also be caused by inflammations of the uterus and its appendages, the prostate and seminal vesicles.

Sitting upon cold stones or wet seats is very frequently the exciting cause of acute catarrhal proctitis. Coachmen are said to be particularly liable to the disease on this account. The author has seen a number of cases in young people who, after exciting exercise, such as tennis, baseball, or cricket, have sat down upon the damp ground, thus causing a sudden chill to the parts, which resulted in attacks of acute catarrh of the rectum and sigmoid.

Acute congestion of the liver sometimes terminates in catarrhal inflammation of the rectum, due to obstruction of the portal circulation, and also to the irritating influences of excessive discharges of bile which follow such attacks. Mild attacks of this disease may also be produced by the action of irritating cathartics, such as jalap, aloes, gamboge, rhubarb, podophyllin, and senna.

Finally, attention must be directed to personal idiosyncrasies with regard to the development of this disease. In the author's experience an acute catarrhal condition of the lower end of the intestinal tract would be produced in one individual by a single cup of coffee; another patient could never eat strawberries without having afterward an acute

rectal catarrh, almost dysenteric in its nature; another suffered from this condition if he drank a single glass of ordinary apple cider. These idiosyncrasies might be multiplied, but they are not pertinent to the subject; each individual forms a problem in himself, and no generalization can be drawn from them.

Treatment.—The treatment of this form of disease like all others demands the removal of the cause if possible. When it is due to irritating, infectious, or putrefying substances in the intestinal canal, they should be evacuated at once either by saline cathartics or intestinal lavage; if there be foreign bodies or impacted feces in the rectum, these should be removed; but great care should be exercised in their removal to avoid all traumatism and injury to the parts. The dilatation of the sphincters gives great relief to the patient when the catarrhal inflammation is low down about the margin of the anus.

Saline laxatives, such as sulphate of magnesia, sulphate of soda, cream of tartar and sulphur; or some of the mineral waters, such as Rubinat, Hunyadi János, or Apenta are exceedingly useful. One should not hesitate in the use of these medicines to give a sufficient quantity to produce a thorough washing out of the parts by the watery movements which they produce. Small doses do more harm than good, and even in patients who are very weak and debilitated no bad result follows full-sized doses of these remedies.

After the bowels have been thoroughly cleaned out, antiphlogistic remedies should be applied; irrigation with cold water is very grateful to most patients, to others very hot water soothes the parts more effectually, and in a number of cases alternating currents of hot and cold water may be used with very gratifying results. The hard-



FIG. 83.—TUTTLE'S RECTAL IRRIGATOR.

rubber rectal irrigator (Fig. 83) of the author and a fountain syringe will be found very satisfactory for this purpose. It is made in various sizes so that it can be used with comparative comfort in cases with both contracted and relaxed sphincters.

It consists in a hard-rubber cylinder, through the center of which runs a small tube connecting with three openings in the distal end. This tube carries the fluid into the rectum. The large cylinder has numerous openings upon the sides large enough to admit of the passage of small faecal particles, and it is connected at the outer end with a discharge pipe, to which is attached a rubber tube long enough to reach a basin on the floor when the patient lies upon the bed. The instrument can be taken apart and thoroughly sterilized. It is used with

the patient lying upon the side, and any quantity of fluid can be thus passed through the rectum without wetting the bedclothes or necessitating a movement of the bowels. When the hot and cold water are alternated a Y-tube is used to connect the irrigator with two syringes containing the water. By this means therapeutic agents may be applied to the parts; solutions of carbolic acid .5 to 1 per cent, of boric acid 5 per cent, of thymol 2 per cent, nitrate of silver 1 to 2,000, of hydrastis 1 to 2 per cent, of the aqueous fluid extract of krameria 5 to 20 per cent. After the irrigation has been continued ten to fifteen minutes, the fluid should all be drained out of the rectum through the irrigator, and a suppository of opium and iodoform introduced. The particular solution used for irrigation will depend upon the indications in each individual case. Krameria and nitrate of silver are the most generally employed.

Sometimes the parts about the anus are so tender that the introduction of the irrigator can not be borne. In such instances two small rubber catheters can be used, one for the inflow and one for the exit of the irrigating fluid. The use of enemata is not advised because they only increase the tenesmus and the desire to go to stool. Sometimes after the irrigation, the introduction of a small amount of flax-seed tea, about 1 ounce, with $\frac{1}{2}$ to 1 grain of opium and 30 minims of the aqueous fluid extract of krameria will prove very soothing to the parts, and be effectual to quiet tenesmus. Regulated, unirritating diet should be enjoined. Most writers insist upon the use of milk, but this article is so prone to produce hard, tough scybalæ which constipate the individual and irritate the inflamed surfaces by their passage over them, that thin gruels, beef, mutton, and chicken broths, or some of the prepared foods, such as Mellen's, Carnrick's, or beef peptonoids, are to be preferred.

After the acute inflammatory stage is passed, when suppuration and ulceration occur, the irrigation with antiseptic solutions should be continued, and if the disease is low down, the rectum may be sprayed with some astringent solution, such as nitrate of silver or argyrol; powders, such as bismuth, aristol, or antinosine, may be insufflated through a tubular speculum directly upon the ulcer if it be isolated, or all over the rectal wall if there is general ulceration, by placing the patient in the knee-chest posture and obtaining atmospheric dilatation. Sulphate of copper, and also sulpho-carbolate of zinc, in mild solutions, have acted very well as sprays in this condition.

The bowels should be induced to move at regular intervals, and the rectum should be irrigated after each movement. The patient should be kept in bed until the pus and blood have entirely ceased to be discharged. The dietary regimen, however, should be kept up for some little

time after the patient has got up. If the disease is high up in the sigmoid flexure or colon, lavage through the long rectal bougie should be carried out with the patient in the knee-chest posture, and large quantities of the solution should be introduced: as much as 2 gallons of boric-acid solution or a 1-to-10,000 bichloride of mercury may be thus introduced. The solutions rapidly come away, and there is no danger from the amount of the drug which will be absorbed.

Medicines by the mouth are not generally effective. Antiferments, such as beta-naphthol, salol, subnitrate of bismuth, and creosote, may sometimes be effectual in the prevention of further fermentation in the intestinal canal. The enteric pills, composed of sulpho-carbolate of zinc and covered with a coating which is not soluble in the acid secretions of the stomach, are occasionally effectual. These cases are more benefited by the use of a pill that contains sulphate of copper $\frac{1}{8}$ grain, and extract of opium $\frac{1}{4}$ grain than by any other drugs; these are given every two hours, and the result is sometimes magical in the relief of the tenesmus and the tendency to diarrhoea. Castor-oil, as a laxative, has not proved as effectual in producing a movement that is watery and cleansing as have the saline preparations, and, moreover, it leaves a tendency to constipation in the patient which is not satisfactory; nevertheless, many authors prefer this to all other laxative medicines in such conditions. In minute doses (5 minims), repeated every two hours, it is sometimes very soothing to the bowel and checks the tendency to diarrhoea. Fluid extract of hamamelis and liquor of bismuth, of each from 1 to 2 drachms, is spoken of very highly. To the out-of-town practitioners, who have not large pharmacies to order from, the flaxseed tea, witch-hazel, and astringent washes will generally prove quite satisfactory.

CHRONIC PROCTITIS AND SIGMOIDITIS

There are two types of chronic catarrhal inflammation of the rectum and sigmoid, the *hypertrophic* and *atrophic*. The acute form may merge into a chronic state, and when this takes place it generally develops into what is known as hypertrophic catarrh.

Hypertrophic Catarrh.—This type is sometimes described as acute and chronic, but practically it is always chronic. It has been confused in some recent writings (Quénu, Hamonic, and Reclus) with proliferating rectitis, which is a syphilitic inflammation. It is not confined to one portion, but affects all of the large intestine, the sigmoid and rectum as well.

Pathological Anatomy.—The mucous membrane and submucosa in this condition are always thickened; the glandular elements of the

membrane are markedly hypertrophied; the Lieberkühn follicles are deepened, the intertubular substance is increased (Fig. 84), and there is an increase in the number of goblet or mucus-producing cells. The connective tissue of the submucosa is increased; here and there elastic fibers are found in it, but there is no evidence of cicatricial formation. Around the blood-vessels, which are numerous, and between them and the true mucosa, is a mass of embryonic tissue of variable thickness. The blood-vessel walls appear normal or somewhat thinned.

Bacterial culture from the scrapings of this condition show only the spores and bacteria ordinarily found in the intestinal tract. The muco-pus, collected by scraping, shows under the microscope pus-cells, leucocytes, and various bacteria, together with small masses of faecal matter and undigested particles of food.

Etiology.—The cause of this condition may be *intra-* or *extra-intestinal*; it may follow acute colitis or proctitis, or it may develop from the same causes which produce these conditions. It may also be produced by conditions external to the intestine. Adhesive bands which constrict the colon or which rub against it during peristaltic action may cause congestion, thus setting up a hyperæmia and hyperplasia which eventuate in hypertrophic catarrh.

Abdominal tumors or displaced uteri that press upon the intestine may excite this condition; movable kidneys, especially those which slide up and down with every respiration, and rub against the wall of the ascending or descending colon, may induce, or certainly they may keep up, an inflammatory condition of the large intestine which extends to the rectum. Catarrhal appendicitis also has its influence in producing or protracting this disease. It has frequently been held that this form of appendicitis is due to the catarrhal condition of the bowel, a proposition which it is impossible to prove or disprove. The fact remains, however, that a patient with a catarrhal condition of the colon, complicated by catarrhal appendicitis, will very often recover very promptly if the appendix is removed. Pathology and bacteriology have

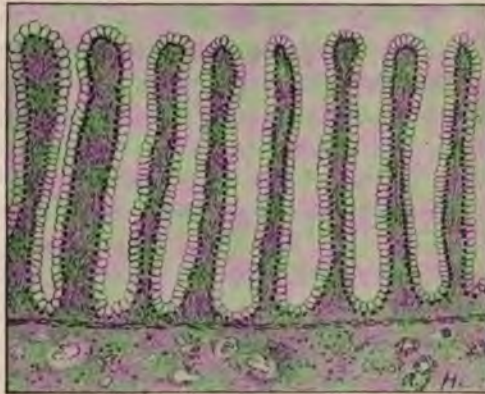


FIG. 84.—HYPERTROPHIC CATARRHAL PROCTITIS.
Specimen showing increase in depth of tubules and intertubular substance.

thrown no particular light upon the etiology of this disease, and it is only from clinical observations that we can draw our conclusions. The same irregularities in diet, habits, and exercise which produce acute catarrhal conditions of the intestine will also produce this. The chief etiological factor in this disease is said to be chronic constipation.

Symptoms.—In the early stages of this disease the symptoms are vague and indefinite, unless it succeeds an acute catarrh, under which circumstances there is simply an amelioration of the acute symptoms and a gradual development of the chronic condition. The disease is not confined to the rectum; it usually affects the sigmoid flexure and colon as well; hence the symptoms may be referred to a wide area. There are flatulence, tenesmus, loss of appetite, and general malaise; the tongue is flabby and coated white; diarrhœa sometimes alternates with constipation; the stools are either soft, semifluid, and mixed with mucus, or they may be hard and round like sheep-balls, and covered with this muco-purulent secretion. As the disease progresses the constitutional and digestive symptoms become more marked; periodic tenesmus occurs, after which there is a profuse passage of thick, glairy mucus mixed with pus, and sometimes tinged with blood. The patient is nearly always aware of the approach of such attacks, and is much exhausted after the mucous passages. There is not much pain about the lower end of the rectum, but rather a feeling of weight and discomfort.

The secretion from the mucous membrane is abundant, and sometimes it oozes out through the sphincter, keeping the anal tissues moist and macerated. Occasionally this produces an erythema or dermatitis which may be mistaken for moist eczema. The discharge is sometimes so profuse that a patient is compelled to wear a napkin. The radial folds are hypertrophied, and between them there frequently occur small fissures, but as the sphincters are relaxed these are not very painful. Puritus is one of the most frequent symptoms, and sometimes the only one which induces the patient to consult a physician. The disease occurs most frequently in plethoric, fat, flabby individuals, but it is also seen in thin, neurotic persons.

Around the anus one may frequently see hypertrophies of the papillæ develop into typical condylomata with dendritic formation. This condition extends well up into the anus, and becomes less marked as the ano-rectal line is approached. The hypertrophy, however, seems to begin again in the mucous membrane, and extends indefinitely. To the digital touch the mucous membrane presents a soft, doughy feeling with a somewhat closer approximation of the walls than is normal. Through the speculum it appears œdematous, paler than usual, and covered with a thin coat of whitish secretion (Plate I, Fig. 5). The swollen membrane bulges out into the fenestra of the conical speculum, or falls down and complete-

ly covers the end of the proctoscope. When the muco-pus is wiped off, the membrane presents through the magnifying glass a cauliflower-like appearance, whitish and granular. It does not bleed easily, and the end of a fine probe being pressed down upon its surface, the tissues will meet together above it. By scraping with a rectal scoop one may obtain a certain amount of muco-purulent fluid the composition of which has been already mentioned. Hæmorrhages are not characteristic of this disease, neither are hæmorrhoids. The latter sometimes develop, but they are of the connective tissue and not the hæmorrhagic type; the mucous membrane covering them is thickened, but the author has never been able to establish the transformation from cylindrical to stratified pavement epithelium over the parts, as has been described by Hamonic and Quénu.

There is often a sensation after stool of something more to come away. This may result from a partial prolapse or from the retention of a certain amount of mucus in a posterior or anterior rectoceles. The introduction of the finger into the rectum will sometimes result in the passage of this accumulation, and the patient will be relieved. After the passages of muco-purulent material there is often a burning, itching sensation around the anus.

The papillæ around the upper margin of the pecten are frequently much hypertrophied, and the crypts of Morgagni are swollen and inflamed. Constipation becomes a most annoying feature in the later stages; the patient does not succeed in having a movement of the bowels without the greatest effort. Large doses of laxatives and recto-colonic flushing are necessary in order to provoke a movement. In the meantime between the stools the patient suffers from an inclination to defecate, which results, after more or less straining and tenesmus, in the passage of a small quantity of mucus, sometimes tinged with blood and pus. There are swelling of the abdomen, intestinal griping pain, nausea, and vomiting. The patients gradually develop vague nervous symptoms, become apprehensive and hypochondriacal, or they may have grave mental symptoms.

Treatment.—The treatment of this form of catarrh is necessarily prolonged and tedious. Where a tumor, floating kidney, displaced uterus, or tenderness over the appendix exists, one should not commit himself to a too favorable prognosis from local treatment, for it may be necessary to operate for the complication before a cure can be obtained.

It may be asked why we do not operate immediately in such cases. If it is an extremely chronic condition, and modern treatment has been tried without effect, then it would be perfectly proper to do so. But where the case is a subacute one, where the condition has lasted only two or three months, where no proper dietary regimen and local treat-

ment have been carried out, one can not say that all the therapeutic measures have been exhausted; these should be tried before any serious operation is undertaken, provided life and general health are not endangered by such delay.

Assuming that the ætiological factor is intra-intestinal, the first object in the treatment should be to remove it. Get rid of whatever irritates the intestinal mucous membrane, whether it be hardened faecal masses, fermenting intestinal products, cestodes, or whatever foreign substance may be in the patient's bowels or rectum.

The best thing for such radical cleaning out of the intestinal canal is sulphate of magnesia 5 parts and bicarbonate of soda 1 part. A table-spoonful of this mixture should be given before breakfast in the morning, and repeated every two or three hours until a thorough watery evacuation is obtained. After this the colon should be flushed with 2 or 3 quarts of boric acid or normal saline solution. The patient's hips should be elevated, or he should be placed in the knee-chest posture; the solution should pass in very slowly; long rectal tubes are unnecessary for this purpose. This fluid should be given at a temperature of about 100°.

Diet.—The patient should be put upon a chiefly nitrogenous diet. Gluten bread or only the crust of stale bread should be allowed. Meats, fowl, fish, and eggs are all admissible; but in the vegetable line only those forms should be used which are practically free from sugar and starchy elements. Of all articles of food, white potatoes are the most injurious in catarrhal diseases of the intestine; there is nothing which ferments more rapidly or furnishes a better medium for the growth and increase of bacterial products than this vegetable. Spinach, lettuce, celery, and such vegetables are all advisable in these cases. A little well-cooked rice may be allowed. String beans, when fresh and green, can also be given.

The effect of coffee and tea is variable; in some patients they have no detrimental influence, while in others no improvement can be obtained until these beverages have been absolutely stopped.

The milk diet, suggested by many writers, has not proved itself beneficial, because it forms hard, insoluble stools which irritate the mucous membrane of the colon as they pass through, and if there be any inflammation at the lower end of the rectum, it often results in faecal impaction there on account of the pain which the patient anticipates from the stool.

Stimulating drinks and alcohol in all forms should be interdicted. Hot water before each meal sometimes has a most excellent effect. Large quantities should be advised in the beginning to flush out the stomach, intestines, and kidneys. Two or three glasses may be taken before each meal; a pinch of salt added sometimes makes it more palatable.

Medicinal.—The bowels should be regulated by mild laxatives if necessary. Malt and cascara, taken upon going to bed, is generally effective. Drugs that are preventive of fermentation are beneficial. Great benefit will be obtained from capsules or powders containing

Salol,	} āā gr. x;
Pancreatin,		
Boric acid .....			gr. v.

To be taken one hour after meals.

Beta-naphthol has occasionally seemed to act more satisfactorily than the above combination. Very good results have followed the internal administration of ichthyol, which is given in the form of enteric pills containing 3 to 5 grains each. When there is a tendency to griping and diarrhœa, as there occasionally is in this condition, small doses of castor-oil, 5 to 10 drops taken in capsules every three or four hours, will quiet this materially.

The local applications will depend very largely upon the extent of the disease. Where the sigmoidoscope reveals the fact that the inflammatory phenomena extend well up into the colon, local applications through the speculum will be practically of little benefit. In such conditions it is well to place the patient in the knee-chest posture, and with the long bougie, described above, introduce 1 to 3 quarts of a 2- to 10-per-cent solution of aqueous fluid extract of krameria. Peroxide of hydrogen, 10 to 20 per cent, extract of hydrastis, 1 ounce to 2 quarts of hot water, a 1-to-10,000 solution of bichloride of mercury, or a 1-to-5,000 solution of nitrate of silver may all be used in the same manner. The krameria, however, has given the best results, and generally under its use the condition rapidly improves. This drug as found ordinarily in the shops is absolutely useless. The preparation which is recommended, according to a formula devised for the author by Dr. Müller some ten years ago, is prepared as follows:

Macerate one pound of bark of krameria in a long percolating tube for twenty-four hours. After this a mixture of 20 per cent glycerin and 80 per cent water is allowed to percolate through it. The percolate should be constantly stirred and refiltrated through the bark the second time. The filtrate is then evaporated down to one pound, thus obtaining an aqueous fluid extract containing grain for grain all the therapeutic properties of the bark. The preparation should be kept in a dark place and not exposed to the air.

This can be mixed freely with water in any proportion, and throws down no sediment; it can be introduced into the tenderest rectum without producing irritation; it is an astringent, and apparently soothes pain

and reduces inflammation. For irrigation it is used in strengths of from 2 to 20 per cent, and for local applications it may be used pure.

If there is any ulceration within view through the sigmoidoscope, the parts should be sponged or sprayed with a 2-per-cent solution of nitrate of silver. Applications of iodine or antinosine are also useful under these circumstances.

Injections of sweet-oil and iodoform have not been satisfactory in my hands in this form of catarrh, but occasionally relief has been given in the spasmodic attacks by high injections of 6 ounces of olive-oil, with half an ounce of glycerin.

Recently some very good results have been obtained from high injections of 1 or 2 per cent ichthyol in olive- or cod-liver oil. Four to 6 ounces are injected once in two or three days.

Bitter tonics, cod-liver oil, hypophosphites, bone marrow, and such products as protonuclein or organo serum should all be tried along with the local treatment before resorting to surgical measures; but, on the other hand, one should not wait on these too long.

Atrophic Catarrh.—This is the most frequent type of catarrhal inflammation of the rectum, and it is always chronic. It is found frequently in people about the age of puberty, and in constantly increasing numbers as they progress in years. The process may begin in early life; it consists in a general atrophy of the mucous membrane and its glandular

elements throughout the rectum and sigmoid flexure. It is usually limited to these parts, and rarely ascends as high as the descending colon.

Pathological Anatomy.

—One observes upon examining the mucous membrane in these cases an irregular, bosselated, or granular appearance. The surface is dry, rough, inelastic, and without any salient vegetations. Attached to the surface here and there are small masses

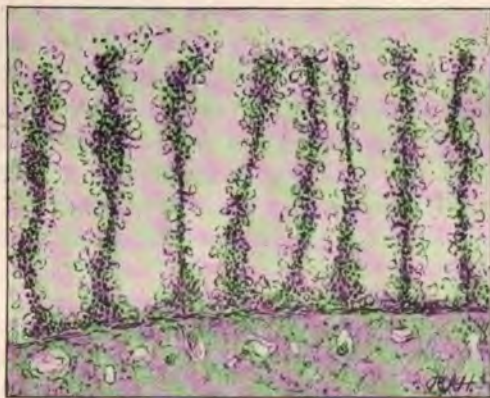


FIG. 85.—ATROPHIC CATARRHAL PROCTITIS.

Specimen showing atrophy and exfoliation of epithelial cells and decrease in intertubular substance.

of dry faecal material, and occasionally little islands of necrotic epithelium or pseudo-membrane (Plate I, Fig. 2).

Microscopic examination shows the epithelium absent in many places, but always present in the deeper portions of the crypts of Lieberkühn.

These follicles are generally atrophied, the intertubular tissue decreased (Fig. 85), and their goblet-cells are few in number. The cylindrical epithelium is said to assume the stratified pavement type in this disease (Quénu, Hamonic). This change does not extend more than 1 or 2 centimeters above the ano-rectal line; it is confined to the superficial surface of the membrane, and does not involve the tubules.

The connective tissue of the submucous coat is dense and slightly thickened; it does not contain embryonic tissue and elastic fibers, as in the hypertrophic form. The solitary follicles are often enlarged and distended. At points there are distinct granulations and ulcerations accompanied with hyperæmia and multiplication of the blood-vessels, but there is no alteration in the blood-vessel walls.

Etiology.—It has been suggested that this disease may be produced by emanations from foul closets and improper detergent material. The author at one time laid some stress upon these factors, but in recent years he has seen such a large increase in this type of disease among a class of people in whom such factors could not be frequent that they are no longer considered seriously. The fact that this condition is so frequently associated with obscure syphilitic disease, leads him to suspect this in almost every case; whether it be acquired or hereditary, vicious or innocent, it is a distinctly etiological factor in this type of inflammation. In the majority of cases there is a history of chronic constipation associated with the habitual use of laxative pills, purgatives, and hepatic stimulants, all of which contain some resinous cathartic and irritant to the mucous membrane of the rectum. In most of them the continuous use of condiments, and stimulants to the appetite and digestion, late dinners and midnight suppers, associated with little outdoor exercise and arduous social functions, contribute to the production of the disease. Excessive school duties, close, unventilated study-rooms, and improper or insufficient food, all have their influence. Many of those who suffer from this condition in early life also suffer from a dry, catarrhal condition of the nasal mucous membrane, which seems to show that the rectal condition is a part of a general constitutional tendency.

This type of catarrh may also result from the practice of sodomy, the use of irritating enemata, and from foreign bodies in the rectum whether introduced voluntarily or accumulated by passage through the intestinal canal; it also results by vascular or lymphatic extension from chronic inflammation of the pelvic and genito-urinary organs. Very frequently it is associated with old pelvic cellulitis and the adhesions that result from this condition. Perirectal abscesses, fistulæ, and hæmorrhoids are frequently associated with the disease, but their etiological influence is very doubtful.

Symptoms.—The patient will complain, as a rule, of long-continued

constipation. The stools are dry and hard, coated more or less with mucus, and sometimes tinged with blood; there is often severe pain after them, and this circumstance leads to the diagnosis of fissure in ano. Heat and burning in the region of the sacrum and in the rectum are frequent symptoms; the sphincters are always more or less spasmodic. Introduction of the finger or of the speculum is often painful. Stretching apart of the folds of the buttocks will produce cracks or minute fissures in the muco-cutaneous tissue of the anus. These little fissures may be produced by the passage of a hard faecal mass, and result in burning, itching, and sometimes actual pain. They are very shallow; they occur at any point in the circumference regardless of the radial folds, and heal rapidly, only to recur when the parts are stretched again.

Hæmorrhoids are a constant complication of this type of the disease. Frequently these are assumed to be the cause of the disease instead of the result, and the patient is operated upon only to be disappointed in finding himself unimproved. To the eye the mucous membrane is bright-red and of a shiny appearance, with little masses of inspissated fæces adhering to it here and there (Plate I, Fig. 3). It does not protrude itself into the fenestra, nor does it collapse over the end of the tubular speculum, as in the hypertrophic form. The surface is dry to the touch, and adheres to the finger as the latter is pushed upward; there is a general atony of the walls of the rectum in old cases; the rugæ seem almost obliterated, and the valves of Houston stand out more prominently than is usual. There is nearly always marked dilatation of the rectal ampulla in these cases. Often when the finger passes the internal sphincter it glides into a widely distended cavity, the sides or top of which it can scarcely touch. In this pouch faecal masses accumulate and frequently lie from day to day until they become quite large, and sometimes result in faecal impaction.

Ulceration is more frequent in this form of catarrhal disease than in the hypertrophic. The mucous membrane of the entire rectum may be eroded and more or less deeply ulcerated in spots (Plate I, Fig. 6). This is due to the traumatism produced by the passage of dry, hard fæces over an improperly lubricated mucous membrane and subsequent infection. The resting of these hard masses in one position may interfere with the circulation and produce ulceration. Constipation, flatulence, and indigestion are always a part of this affection; the complexion may be sallow, and the skin harsh and dry; the tongue is frequently coated a dirty yellow, and there is a bad taste in the mouth on rising in the morning; the appetite is frequently impaired, and the patient loses flesh; the stools are always hard, lumpy, and coated slightly with mucus, blood, or pus. Pruritus is often an annoying symptom, and interferes with the patient's rest at night.

Treatment.—This form of inflammation, being limited largely to the rectum and lower sigmoid, is plainly within view through the proctoscope, and consequently is more susceptible to local treatment than the other forms.

The whole field affected can be observed and treated from below, and, as a matter of fact, no treatment from above is likely to prove efficacious except in so far as it prevents irritating and infectious materials from passing through the diseased area. Whatever will produce non-irritating, soft, and easy stools will conduce to the healing of these parts. It will be unnecessary to continually flush the colon by drastic purges in order to keep the parts clean. This may be accomplished by simple enemata, or more completely by lavage of the sigmoid flexure and rectum through the ordinary rectal irrigator, and by this means the constant peristalsis and motion of the parts caused by cathartics will be avoided.

When there is reason to suspect the possibility of syphilitic infection, it is well to administer specific remedies along with the local treatment for this condition. As has been stated elsewhere, the use of mercury internally is inadvisable on account of the peristaltic action and diarrhœa which it induces. It allows no rest to the parts. Inunctions, mercuric baths, and the hypodermic administration of the drug are all superior to its internal administration in cases of this kind. At the same time a certain amount of iodides should be given if the patient's stomach does not rebel against them.

If there is no specific element in the case, tonics, such as cod-liver oil, hypophosphites, and some assimilable form of iron are always called for. As a rule, however, iron is objectionable in that it tends to constipation and the production of hard, irritating stools. Malt with various tonic constituents is an excellent remedy; combined with the fluid extract of cascara, and administered at bedtime, it gives a certain but easy movement of the bowels on the day following. This and cold water enemata are the chief remedies for regulating the bowels in this condition; though occasionally recourse must be had to others, such as small doses of calomel and soda, podophyllin, colocynth, and saline waters. These latter, however, should not be repeated frequently.

The diet, while it should be as carefully governed in this condition as in the hypertrophic catarrh, is not necessarily so limited. Starchy products may be taken in moderation, and also a few sweets. Potatoes, however, for the reasons before indicated, are interdicted. Coffee and tea are both injurious in these cases, and alcohol is to be avoided. Pure food in generous quantities, fresh air, and outdoor exercise, especially horseback riding, should all be encouraged.

Local Treatment.—For the local treatment a great many remedies are recommended in the books upon rectal and general diseases, but argo-

nin, nitrate of silver, ichthyol, hydrastis, and oil with glycerin are those that will be found most useful. These remedies should be applied after the rectum has been thoroughly emptied either by a laxative or cold-water enema; they may be introduced through the Wales bougie, and should always be carried up into the sigmoid flexure as high as the disease extends. The strengths of the solutions are governed by the condition of the gut. When there is an extremely dry condition of the mucous membrane, with tenacious mucus and inspissated fecal masses adherent to it, the parts should be wiped off with pledgets of cotton, and comparatively strong stimulating applications made. In such cases the cavity should be swabbed out or sprayed with a 2- to 5-per-cent solution of nitrate of silver. This treatment, however, if carried out in the sigmoid flexure, produces considerable griping and pain; therefore, when the disease extends high up the use of argonin in solutions of 5 to 10 per cent is to be preferred. This drug is applied as follows:

The patient is placed in the knee-chest posture, the pneumatic sigmoidoscope is carried up well into the sigmoid flexure, the latter being distended by pneumatic pressure; after this the eyepiece of the instrument is removed, and $\frac{1}{2}$ to 1 ounce of the solution is poured into the gut through the tube; the eyepiece is then replaced, and the gut again distended as the tube is withdrawn, leaving the solution well up in the sigmoid. As soon as the speculum is removed, peristaltic action carries the drug downward and applies it to all the portions of the intestine below.

Irrigation with hot water stimulates the circulation in these conditions, and hastens the absorption of any inflammatory products which may be present. It is useless, however, to inject a pint or quart of hot water into the bowel for this purpose and allow it to be passed out within a few moments. The irrigation should be carried out by means of a rectal irrigator (Fig. 83), and should be kept up for fifteen to twenty minutes at a time. The water should flow very slowly, and the temperature should be gradually increased until it reaches 115° F.

After the irrigation, the applications of argonin or nitrate of silver will be more effectual, inasmuch as the mucus and pus will have been washed away from the parts. This treatment should be carried out daily at first, and afterward the periods may be lengthened gradually until the applications are necessary only once a week. Sometimes where the irrigation and stimulating applications set up irritation in the rectum and sigmoid, it is well to inject into the sigmoid-at bedtime 2 or 3 ounces of a 20-per-cent solution of the fluid extract of krameria. These methods of treatment frequently keep the bowels regular without any laxative medicines or cold-water enemata. If there is much itching and

burning, and if the skin cracks easily about the margin of the anus, applications of the following mixture will give great relief:

R Acidi carbolic	3j;
Acidi salicylici	3ss;
Glycerini	3j.

This should be painted over the anus at bedtime.

After this an ointment of 5 per cent ichthyol and 95 per cent lanolin is applied. By treatment with the Wales bougie the sphincter is gradually but gently dilated, the mucous membrane becomes softened under the influence of the ichthyol and lanolin, the itching is relieved by the carbolic compound, and the patient's symptoms rapidly improve. If necessary, a cold-water enema is given every morning to move the bowels. This may be continued indefinitely. It not only induces a proper movement, but also reduces the congestion of hæmorrhoids. Occasionally where the fissure-like cracks in the mucous membrane involve the ends of the sensory nerve, stretching under nitrous-oxide gas or ethyl chloride will be necessary. These cases, however, are exceedingly rare.

Nothing except soft cotton or moistened tissue paper should be used for detergent purposes. In this condition washes and bathing are not injurious at all, inasmuch as they keep the membrane softened and flexible, and thus prevent to a certain extent the cracking. Sweet-oil and iodoform have been used a number of times in this condition, but experience shows they are not equal to the remedies described, and are much more expensive. When there are ulcerations upon the mucous membrane, as in Plate I, Fig. 6, an insufflation of antinosine directly to the ulcerated spot is of great benefit. The author has applied nitrate of silver to these conditions, and has found that the healing has been slow and the suppuration marked. Under the use of antinosine and iodine there is no suppuration to speak of, and the healing is exceedingly rapid. In cases in which there is a marked posterior rectocele care should be taken to see that this pocket is well emptied, and that no small fæcal balls or foreign substances accumulate therein.

In very chronic cases much benefit will be derived from a nightly injection of 3 ounces of olive-oil and $\frac{1}{2}$ ounce of glycerin. Albolene with 1 per cent of carbolic acid or $\frac{1}{2}$ per cent of menthol seems to have a soothing effect in some cases. Occasionally when the hæmorrhoids are marked and so inflamed that local treatment of the parts is irritating and painful, it is necessary to operate upon these first and treat the catarrhal condition afterward.

With the patient under anæsthesia for the hæmorrhoidal operation the author has sometimes touched the mucous membrane at spots all around with the thermo-cautery, and has found that it had a remark-

ably good influence upon the condition. As a rule, however, it is better not to interfere with the hæmorrhoidal growths in this condition until the catarrhal phenomena have been controlled, and in a large number of cases they will be found to have disappeared along with the catarrhal condition.

Fistulæ and extensive ulcerations occur in connection with this disease, and should be treated by the methods laid down in the chapters upon these subjects. The treatment of the two conditions need not interfere with each other, except in those cases in which the fistula is dissected out and the parts sewed together. Here one must wait until the parts have healed. Under other circumstances the treatment of the catarrhal condition may be continued immediately after operation, and thus considerable time will be saved.

SPECIFIC CATARRHAL INFLAMMATIONS

Of these we have mentioned in our classification four special varieties. The gonorrhœal and syphilitic types will be treated of in the chapter upon Venereal Diseases of the Rectum and Sigmoid.

Dysenteric Proctitis and Sigmoiditis.—In order to understand the effects of dysentery in the rectum and sigmoid, it will be necessary to review that disease briefly. Authorities differ as to the distribution of the lesions in dysentery; all agree, however, that sooner or later in every type they are found at the lower end of the intestinal tract.

Etiology.—Heat, cold, excessive exercise, improper diet, bad water, faulty drainage, the environments of army life and that in large eleemosynary institutions, have at times been looked upon as causes of dysentery, but it is now believed that the disease is always the result of infection. When Councilman and Lafleur (Johns Hopkins Hospital Reports, 1891) associated amœbæ dysenteriae with this disease it was thought its etiology had been finally settled. Later, however, the bacillus of Shiga (Centralblatt f. Bakt. u. Parasitenk., 1898, Nos. 22 and 24) was announced as the only pathogenic agent constantly found in epidemic dysentery of Japan; and when Flexner confirmed this observation it seemed for a time that the specific influence of the amœbæ had been disproved. The arguments against the amœbæ were: it was found in water; also in other diseases; it was not constantly present in epidemic dysentery; it could not be isolated as a pure culture. Flexner finally concluded that the amœbæ had some pathogenic influence; he held, however, with Kartulis, Kruse, Paschal, and Cruikshank that it must be associated with other pathogenic organisms in order to produce dysentery (Journal American Medical Association, January 5, 1901). Pathologists have sought diligently to establish the unity of dysentery,

but Flexner, Vaillard, Vedder, and Duval (*Journal Experimental Medicine*, 1902, No. 2), and Kruse (*Deutsch. med. Wochens.*, 1901, Nos. 2, 3, and 24) have each described bacilli dysenteriae differing from that of Shiga. Kruse describes that discovered by him as "pseudo bacillus," but Gay and Duval claim that all these varieties belong to one type. Admitting the latter, the fact that many cases have been observed in which the bacilli were absent and the agglutination tests failed, and yet in which the amœbæ dysenteriae were present, has led to the conclusion that this unity of the disease can not be established. In the discussion in the British Medical Association in 1902, it was clearly proved that there are three types of dysentery: The catarrhal, the amœbic, and the bacillary. To these may be added a fourth, due to mixed infections. Councilman and Lafleur applied the term tropical dysentery to those due to amœbic infection. This term is misleading, for it is now well known that amœbic dysentery also originates in temperate climates; the author has seen it in patients who have never been south of the thirty-fifth parallel of latitude; and in the southern portion of the United States the disease occurs frequently. Until recently it was generally assumed that bacillary dysentery was confined to the warmer zones. Recent investigations, however, have proved that even this type may develop in the colder zones. Vedder and Duval (*op. cit.*) have found the bacilli in dysentery originating in the United States, and more recently Duval and Basset (*American Medicine*, vol. iv, page 417), Wollenstein, Lambert, and Jones have discovered it in the ordinary summer diarrhœa of children in and about New York. Such wide-spread prevalence of the organism in such clinically different cases seems to cast some doubt upon its specific influence in true dysentery, especially when we consider the fact that Fletcher (*Journal American Medical Association*, August 24, 1903), in his report of 119 cases in Johns Hopkins Hospital, says that all showed the presence of amœbæ dysenteriae and none responded to the bacillary tests. In the cases treated by the author in which the bacilli were found, amœbæ were also present; it was impossible, therefore, to decide which was the etiological factor. The weight of evidence, however, is in favor of the specific influence of the Shiga bacillus, and clinicians are therefore forced to the conclusion that the four types of dysentery mentioned above are established and must be dealt with accordingly.

Catarrhal Dysentery.—The etiological factor in the peculiar dysentery seen in large eleemosynary institutions has not yet been discovered, and therefore it is placed in this class. In the absence of any specific organism one must consider this disease as nothing more than the acute catarrhal inflammation of the lower bowel, described in the first paragraph of this chapter.

Bacillary Dysentery.—This type of dysentery is due to infection of the mucous membrane itself by the Shiga bacillus or one of its prototypes. The source of the bacillus is practically unknown. It is supposed to enter the intestine through food and drink, though it has not been discovered in them.

Symptoms.—The onset is sudden, sometimes with a chill, followed by a rise in temperature, acute griping pains and burning in the rectum. The stools are at first semi-formed, then liquid, and finally they are composed of nothing but mucus and fresh blood. Tenesmus is marked, emaciation is rapid, nausea is frequent, and collapse takes place early in the course of the disease. The constitutional symptoms are due to toxins and not to the activity of the bacilli themselves, for it has been proved by Lentz (Handbuch d. path. Microorganismen, Lieferung 7, page 320) and Todd (British Medical Journal, December 5, 1903) that these may be caused by the injection of dead as well as living bacilli into the subject. No reports have been made of proctoscopic examinations in acute bacillary dysentery. The necropsies, however, show that the lesions are largely confined to the lower end of the colon. The infection is superficial, and rarely spreads to the peritonæum or neighboring organs. The area of colon infected is large, the ulcers assume irregular forms and bleed easily. The whole circumference of the gut is involved in the intense infection, and the mucous membrane may slough away leaving a raw, granulating surface over various lengths of the colon. The bacilli are found abundantly in the stools and in the scrapings from the intestinal wall, but microscopical examinations have failed to demonstrate their presence in the outer layers of the gut. The bases of the ulcers are usually soft, but in severe cases they become fibrous and show marked contraction on healing, thus indicating the possibility of stricture. The blood responds to the agglutination test. Convalescence is slow and relapses are frequent.

Treatment.—The experience of Buchanan (British Medical Journal, February 1, 1900, vol. i, page 800, and 1902, vol. ii, page 843) and Cruikshank (Jour. Amer. Med. Assoc., 1901, vol. i, page 54) show that treatment by large doses of sulphate of magnesium and sulphate of soda give the best results, especially if associated with irrigation of the colon. Some prefer the use of castor-oil, and if taken early in the disease it is sometimes successful. Normal saline solution and a solution of sulphate of quinine, 1-1,000, are the irrigants recommended. Opium in sufficient quantities to control tenesmus and diarrhœa is often necessary; internal medication other than tonics is contraindicated. Ipecacuanha has long been considered a sort of specific for dysentery, but the latest authorities are almost unanimous in condemning it.

The serum treatment of bacillary dysentery is worthy of serious

consideration. It is based upon the fact, already mentioned, that the constitutional symptoms are due to a toxin derived from the bacilli and not to the activity of the bacilli themselves. To counteract this toxin an antitoxin is necessary. Shiga, by progressively immunizing horses, produced an antitoxic serum with which 266 cases were treated in the laboratory hospital in Japan, with a mortality of 9.7 per cent. In the same epidemic there was a mortality of 34.7 per cent in 2,736 cases treated without the serum (Public Health Reports, January 5, 1900). Todd (*op. cit.*) has made some interesting experiments with serum obtained by a different process. In animals this serum seems to neutralize virulent toxin injected into the blood, and if it proves as effectual in man we may soon have as useful an adjuvant for the treatment of bacillary dysentery as we have for diphtheria. It will still be necessary to use laxatives and irrigations, however, in order to rid the bowel of the bacilli and prevent further toxæmia. The diet should be milk, animal broths, rice, barley water, etc., with a sufficient amount of stimulants to maintain the strength of the patient.

Amœbic Dysentery.—This form of the disease is due to infection and infiltration of the submucosa by amœbæ dysenteriae; it is much more insidious in its onset than the bacillary. It may appear as an acute diarrhœa with discharges of bloody mucus and more or less burning in the rectum; or it may come on as simple looseness of the bowels with gradually increasing stools; the patient may at first have only two or three passages a day, one of which may be perfectly normal, while the others are thin, watery, and contain much mucus, with or without blood. In the acute cases burning in the rectum and frequent desire to defecate, loss of appetite, and slight elevation of temperature are generally observed; but severe constitutional symptoms are markedly absent; the stools may number from three to forty or more a day; the demand is imperative, but it is rarely associated with excessive pain or tenesmus. In some cases emaciation comes on very early in the disease, while in others it does not occur at all. One of its chief features is its irregular course, consisting of intermissions, relapses, and exacerbations. The disease may last for years, with varied periods of quiescence and recurrence. These quiescent periods may last for months. The recurrences take place in cold as well as warm weather, but more frequently in the latter. As Rogers pointed out and as the writer has observed, the amœbic infection may exist in a latent form and even end in death from complications without noticeable diarrhœa. The chief complications are extreme anæmia, localized peritonitis, and, above all, abscess of the liver.

The local appearance of the parts as observed in two acute cases was as follows; The mucous membrane at the anus was pouting, bright red,

and swollen; the folds were œdematous and painful; the walls of the rectum were in close apposition with each other, hot and tender to the touch, bright red in appearance, and in one case there were several patches of pseudo-membrane. At this stage of the disease no actual ulcerations were observed, but later on they developed in both cases. These ulcers were shallow, irregularly oval in shape, elevated in the center, and had sloping edges. The difference between them and those seen in chronic amœbic dysentery is attributed to the fact that these cases were treated on the basis of a local infection from the beginning, and the amœbæ were destroyed before they had invaded the deeper layers of the submucosa. Rogers states that the lesions appear first as small red dots, which soon develop a yellow spot in the center, due to the loss of epithelium. The writer has frequently seen these in chronic amœbic dysentery; but he did not observe them in either of the acute cases examined.

In the chronic form the ulcers are irregularly round, varying from a split pea to one inch in diameter. They are usually situated upon the summits of the folds of the mucous membrane, the folds of Houston being favorite sites for them (Fig. 85a). The long axis of the ulcer

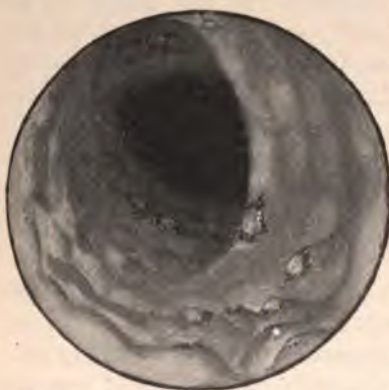


FIG. 85a.—TYPICAL ULCERS OF AMŒBIC DYSENTERY.

is generally at right angles to that of the gut, but when it involves a large area this rule is reversed. The isolated ulcers are well defined; the center is composed of a yellowish mass raised above the level of the mucous membrane; the edges are thickened, prominent, and surrounded by a dark red or purplish zone; in the very chronic forms they may assume a trough-like shape with clear-cut, overhanging edges (Fig. 86), which dip down into the submucosa and sometimes cross one another, producing a stellate appearance.

The mucous membrane between the isolated ulcers appears to be perfectly healthy. Rogers, in his numerous necropsies, has shown that the lesions are larger in the caput coli and ascending colon than elsewhere. In the trough-like ulcers the base is hard and fibrous, and the inflammation may extend to the peritoneal layer, causing adhesions. The yellow gelatinous mass which forms the center of the ulcers is composed of submucosa infiltrated with amœbæ dysenteriae. The latter are more easily found in the small ulcers than in the large. In severe cases, Rogers has seen large sloughs composed of de-

tached shreds of mucous membrane at the site of the ulcer. These cases were always associated with amœbic abscesses of the liver which contained other pathogenic organisms, showing that the gangrene was due to a mixed infection. The odor in these cases was gangrenous and fetid, which is entirely unlike that in amœbic dysentery. When the ulcers begin to heal, the yellow center melts away, assumes a grayish tint, and gradually disappears, leaving a clean granular base, somewhat indurated, and which contracts as it heals.

Distribution of the Lesions.—The author's experience differs from that of the majority of observers with regard to this phase of the disease. Rogers, Fletcher, and others state that the cæcum, appendix, and ascending colon are the chief sites of the lesions. In 116 cases Fletcher rarely found them in the rectum and sigmoid. Strong and others, how-

ever, agree with the writer in stating that these portions of the intestine are by no means infrequently affected. In the experience of the author, typical ulcerations of the rectum and sigmoid were found in 95 per cent of the cases. In every instance except one the character of the lesions was proved by the demonstration of living motile amœbæ in the stools and scrapings from these ulcers. Fletcher bases his diagnosis upon the finding of amœbæ dysenteriae in scrapings from the rectal walls. In a number of instances observed the amœbic ulcers decreased in size and frequency from the rectum upward; in several they entirely disappeared in the upper portion of the sigmoid. Why these experiences should differ so materially, it is impossible to say, unless it be due to the fact that the observations of the writer have all been made upon living subjects, while those of the authors quoted were made upon post-mortem specimens. There is no doubt, however, that the rectum and sigmoid are involved in a large percentage of chronic dysenteries.



FIG. 86.—LINEAR AND STELLATE ULCERATION ON HOUSTON VALVES SEEN IN PATIENT WITH AMOEBIC DYSENTERY.

Amœbæ dysenteriae were present in the rectum at the time this drawing was made. *Trichomonas intestinalis* were also found in the stools at a later period.

Diagnosis.—The diagnostic test is to find in the stools, or in the scrapings from the ulcers, living motile amœbæ dysenteriae. It may require several examinations before they can be found, but when once seen the diagnosis is beyond doubt. The methods of examination for amœbæ are detailed in works on pathology. The writer would call attention, however, to two facts, namely: the amœbæ can not be found easily, if at all, in stools that have once cooled off below 70° F., and secondly, the diagnosis will be much more positive if the amœbæ are observed in the scrapings from the ulcers. The specimens to be examined should either be kept in an oven at the normal temperature of the body, or examined upon warm slides immediately after collection. No examination can be considered diagnostic unless it has been made in this manner.

Treatment.—This disease is an infection and infiltration of the submucosa by amœbæ dysenteriae: there are rarely any serious constitutional manifestations except when due to complications. There is no indication, therefore, for an antitoxin as in bacillary dysentery, but rather for a supporting treatment while the local infection is being eradicated. As the amœbæ are largely buried in the tissues, it will be impossible to destroy them by superficial washing or flushing of the intestinal canal. These methods are important to get rid of those on the surface, but something must be employed that will penetrate the tissues and destroy the buried germs in order to completely cure the disease. The remedies that are toxic to amœbæ dysenteriae are mercuric chloride, silver nitrate, solutions of quinine, and hydrogen peroxide. Bichloride of mercury in warm solutions appears to have no influence in checking the motility of amœbæ unless the strength is so great that it would be dangerous to inject it into the intestinal canal. Silver nitrate in a solution of .5 per cent, if used warm, does not destroy the amœbæ; in solutions of 3 per cent it seems to do so, but in this strength it is very irritating to the bowel, and forms a layer of silver albuminate over the ulcer which simply protects the buried organisms. Rogers has shown that a solution of quinine sulphate, 1-1,000, failed to destroy free amœbæ after several hours' contact; a solution of 1-500 stopped their movements in five to fifteen minutes, although a temporary stimulating effect was sometimes observed. In scrapings from the walls of amœbic abscesses or ulcers the amœbæ were only destroyed after long soaking of the tissues in solutions of 1-500 or even 1-100. Harris, of Atlanta, claims that quinine is not germicidal to amœbæ dysenteriae, but that hydrogen peroxide is. Neither of these authors state whether their experiments were made with cold or warm solution, but as they recommend warm injections it is to be supposed that they used the same in their experiments. Admitting that both quinine and hydrogen peroxide

are germicidal to the amœbæ, it would be impossible to hold the solutions in contact with the ulcers long enough for the fluid to penetrate the tissues and kill the buried germs, for in most patients the intestines are very intolerant of the presence of either drug. The fact that the quinine and silver solutions fail to reach the buried amœbæ accounts for the recurrences of the disease in patients who have been treated with them. The ideal treatment must therefore consist of some method by which this buried organism can be reached and destroyed *in situ*.

It was observed that whenever the specimen stools or the slides upon which amœbæ were being examined cooled below a temperature of 70° F., the motility of the amœbæ was lost and could not be restored. This suggested that if the temperature of the parts containing these organisms could be reduced below 70° F., their infecting and reproductive powers would be eliminated. It was therefore determined to treat these cases by cold injections. At first krameria, ichthyol, quinine, or silver nitrate were introduced into the douches, but one after another was discarded, as it was found that simple cold water was just as effectual as any of the medicated solutions to rid the bowel of amœbæ. In some patients it was necessary to use the long rectal tube in order to get the fluid up in the colon, but in the majority the rectal tip of a fountain syringe was sufficient. The patients were placed in the knee-chest posture and the fluid allowed to run in very slowly. The amount of water that can be received varies; some patients can take only a pint at first, but by perseverance they learn to take even two or three quarts; the time of retention varies also; some can retain the water for one-half or three-quarters of an hour, while others are compelled to go to the toilet immediately after the injection. In the latter class it is necessary to repeat the injection two or three times at each sitting in order to obtain the effects desired. The treatment is always begun by the administration of large doses of sulphate of magnesium, and this process is repeated once every week during the course of treatment. The time consumed in ridding the bowel of the amœbæ depends entirely upon the tolerance of the intestine to cold water; in those cases in which large amounts of very cold water can be retained the organisms disappear in a very short time; while in those who can only retain small quantities for short periods, several weeks are required. In the acute cases seen the amœbæ disappeared from the stools after three days' treatment by the cold injections and never reappeared. In the chronic cases the time required is longer and recurrences may take place. Where there is tenderness over the cæcum and hepatic flexure, an ice-bag is applied over these regions for two hours twice daily. When the bowel is tolerant of hydrogen peroxide, 5 to 10 per cent of this remedy is introduced into the water on account of its beneficial effect on the ulcers and to combat any

mixed-infections that may be present. The water should be used at a temperature of 45° or less. In the acute and subacute cases cold is grateful and soothing to the patient. In the chronic cases there is less tolerance of it.

The localized ulcers in the rectum and sigmoid are treated every other day by local applications of astringent and antiseptic substances; tincture of iodine is one of the best, and antinosine insufflated upon the spots is a most satisfactory method of applying it. Argyrol (50 per cent) is also effectual. Silver nitrate is said to be a specific for these ulcers, but we have never seen a case cured by it. Its effects are too superficial to reach the buried amœbæ. The only internal medication indicated is such as will be found necessary to assist digestion and maintain the strength of the individual while undergoing treatment. Opium suppositories are occasionally necessary to quiet rectal irritability. The diet should be largely nitrogenous, with fats, butter, rice, and stale or toasted bread. In the experience of the author, this line of treatment has succeeded almost invariably, but one can easily conceive of cases so intolerant to cold water that it will be impossible to flood the cæcum and thus reach the seat of the disease. In such cases, as Murray has well stated, it will be necessary to resort to some surgical means to reach the spot and treat the ulcers. There are two methods to do this: the first is that of Weir, who makes a small incision through the abdominal wall at McBurney's point, drags the appendix through this and sutures it to the skin; after union has taken place and the peritoneal cavity is shut off, the appendix is amputated and its opening into the cæcum is utilized for the passage of a small catheter through which the cold water is introduced, thus reaching the upper limits of the disease and flushing the colon from above downward. The second method is by valvular colostomy as recommended by Gibson and described on page 191. Recognizing the fact, as stated by Rogers, that the appendix may be the seat of amœbic infection, it would appear that the method of Weir should be the choice, or at least this organ should be removed in valvular colostomy. In the cases that have been reported as treated in this way sufficient time had not elapsed when they were reported to warrant one saying that the disease was entirely cured, but judging from our experience with cold water in amœbic infections of the rectum, there is every reason to believe that it will be effectual in the upper colon.

Diphtheritic Proctitis.—Pseudo-membranes sometimes occur in the rectum during the late stages of exhausting diseases, such as septicæmia, Bright's, tuberculosis, typhoid fever, etc., but true diphtheria of these is practically unknown. Should its existence in the rectum be established by the presence of Klebs-Loeffler bacilli in the membranes, it should be treated by antitoxin injections and local antiseptic applications.

CHAPTER V

CHRONIC COLITIS, MUCOUS COLITIS, MEMBRANOUS COLITIS

THE rectal specialist is so often consulted with regard to chronic diarrhœa, constipation, and the passage of mucus and membrane, with or without pus and blood from the rectum, that it is absolutely essential he should know the conditions which cause these, and be able to manage them. Formerly such conditions were considered constitutional affections and treated by the general practitioner. To-day they are considered by the best authorities as surgical, and referred to specialists in this line. Some still maintain that they are the result of general constitutional affections, such as anæmia, chlorosis, or neuroses; the latter is a very popular view, and held by some of the best general practitioners.

Since writing upon this subject in 1888 the author has had the opportunity, through the courtesy of his professional friends, to examine and treat a large number of these cases, after long periods of rest in bed and treatment on the neurotic theory had proved unsuccessful, and favorable results in these cases have followed management upon the basis of a local inflammatory disease.

Close investigation has led to the conclusion that the three types of colitis mentioned at the head of this chapter, and described as separate diseases in the works upon general medicine, are practically one and the same, only in different stages of development. The pathological changes are always the same, consisting in a hypertrophic catarrhal inflammation of the colon.

Etiology.—The causes of this condition are the same as those of hypertrophic proctitis, and have been enumerated in the preceding chapter. The neurotic element has always appeared to be an effect rather than a cause, although, no doubt, chronic catarrhal colitis may develop in individuals who are already afflicted with some nervous condition. Under such circumstances it is a complication rather than a cause or a result. If the disease was a neurosis, one would find it much more frequently in insane institutions and hospitals for nervous diseases than anywhere else. Thompson, in an interesting article (*New York Medical News*, 1900, vol. vi, p. 849), takes this view with regard to the neurotic

element. In discussing a case he says: "Although he began to develop all the train of nervous symptoms above referred to, there can be no doubt that none of them had any primary relationship to his trouble, but were purely secondary. The beginning of the disease was clearly due to local irritation excited by local causes, acting first on the lower end of the intestinal tract, and gradually extending upward." He holds that the origin of the disease is in the lower end of the intestinal tract, either the rectum or the sigmoid flexure, and extends upward from that point; that the source of irritation is generally hardened faecal masses or other foreign bodies that rest in the diverticuli of the intestine, and act as irritants; and that the condition may be produced by horseback exercise or bicycle riding. Irritation from the outside, such as pressure by uterine or ovarian tumors, may also occasion the disease.

It is a well-known fact that hardened faecal masses and foreign bodies may lie in the intestine for long periods of time and set up much irritation, and yet the patient may have liquid or semiliquid stools periodically without moving them. There are certain other conditions, however, not mentioned in the books, which occasion colitis. They may be called reflex rather than active causes; yet when they are removed, the symptoms disappear and the patients rapidly recover. Among these attention is invited to three, which are very frequently associated with so-called membranous and mucous colitis. The first of these is inflammatory adhesion of the colon or sigmoid flexure to the pelvic organs or walls; whether the inflammatory process which occasions the adhesion extends to the mucous membrane of the rectum, or whether the irritation produced by its being held firm and immovable while the faecal masses pass over or rest upon it, is a question which is difficult to decide; but, as a matter of fact, after attacks of pelvic or general peritonitis, the colon or sigmoid flexure may become adherent to some other organ of the abdominal cavity, the adhesive bands interfere with the functional motions of the intestine, and result in a localized catarrhal inflammation at the points opposite them. This may be due to the fact that the intestine, being held immovable at this point, the peristaltic action of the parts above produces a temporary intussusception through the fixed portion, and thus by friction and more or less obstruction the inflamed condition is brought about. One of the chief seats for such adhesions is in the neighborhood of the left ovary and in Douglas's *cul-de-sac*; another seat is in the neighborhood of the gall-bladder, where the transverse colon passes in close proximity to it, though this adhesion is more rare than that in the pelvis.

These pelvic adhesions sometimes hold the sigmoid so firmly attached in Douglas's *cul-de-sac*, or behind the uterus, that it can not rise up into the abdominal cavity when distended with gas and faecal mate-

rials. Constipation and faecal impaction are frequently the result of this, and are very difficult to overcome. Through this process the faecal masses are retained in the sigmoid unduly, catarrhal inflammation is established, and even ulceration may result.

The second condition, which may be termed reflex in the production of colitis, is subacute inflammation of the vermiform appendix. It has been the author's experience to see a number of patients who had suffered from digestive symptoms, constipation, mucous and membranous colitis, with general debility and nervous exhaustion, in whom the colitis could be temporarily checked or benefited, and yet after brief periods of time it would return. In 5 such cases the conditions were associated with more or less tenderness over various portions of the abdomen. In only two of them was it limited to the region of the vermiform appendix.

In one of these cases very recently operated upon the symptoms were all in the pelvis, and shooting down the right leg. So much was this the case that the author was firmly convinced that the condition was one of pelvic adhesion that attached the sigmoid flexure either to the peritonæum of Douglas's *cul-de-sac* or to some of the uterine appendages. This view was not shared by the gynaecologists who were called in consultation, both of whom declared that the condition was a neurosis, and that there was no local condition to justify an operation in the woman's case. The fact, however, that these adhesions produced just such symptoms, and had been relieved by breaking up the adhesive bands and restoring the sigmoid flexure to its normal position, led, against the advice of the consultants, to laparotomy for exploratory and remedial purposes. It was a surprise when the hand was passed into the pelvis to find that the ovarian adhesions were so slight that they could not possibly have caused the woman's pains, and that they were not attached to the sigmoid at all. On further investigation, however, it was found that the vermiform appendix was hard, thickened, subacutely inflamed, and adherent to the peritonæum of Douglas's *cul-de-sac*; it passed directly across the sigmoid flexure, and thus prevented the latter from rising up into the abdominal cavity, as it should do normally. There was a slight adhesion of the sigmoid to the anterior rectal wall, which was easily broken up. The appendix was removed, the cæcum restored to its position on the right side, and the sigmoid flexure brought up above the brim of the pelvis and sutured to the abdominal wall. Within a few days after the operation the discharges of mucus decreased, the bowels became regular, and the woman's pain absolutely disappeared.

In the other 4 cases the symptoms were just as marked, and finding nothing in the rectum or sigmoid flexure to account for the irritation, it was decided to perform exploratory laparotomy. The appendix was found in a state of subacute catarrhal inflammation in 2; in 1 it con-

tained pus, and in the fourth the organ was 5 inches long and adherent to the floor of Douglas's *cul-de-sac*. It was removed with the happy result that the symptoms in all four cases disappeared with remarkable promptness. The reflex influences, therefore, of subacute appendicitis in the production of mucous and membranous colitis is well worthy of further study.

In a recent acute case of catarrhal appendicitis, in which the appendix became adherent to the posterior abdominal wall right over the spinal vertebra, symptoms of acute colitis and passages of mucus developed within five days from the original attack, and receded just as promptly upon the removal of the inflamed organ. Such cases will certainly have their bearing in the search for a cause in any obscure case of mucous or membranous colitis.

Another condition, suggested as a cause of colitis, is floating kidney. How often this condition influences the inflammation of the colon, and whether it has any initial exciting effect or not, is impossible to state. The facts from personal experience are limited to a few cases, and to only two operations for the relief of the same. In 4 cases of chronic mucous and membranous colitis the coexistence of movable kidney upon the right side has been observed. As these kidneys did not seem to be attached to the intestine in any way, it at first seemed improbable that they could act as exciting causes of the disease. Finding, however, cases in which no other cause could be ascertained, in which the kidney was more than ordinarily mobile, and therefore demanded restoration and fixation on its own account, it was decided to make the experiment and to observe its influence upon the intestinal condition. At the time of the operation the woman had been treated for several weeks by local applications with more or less unsatisfactory results with regard to the passages of mucus and membrane with the stool. She was operated upon on October 24, 1900, and after the incision was made and the kidney exposed, the following state of affairs was observed: As the woman lay upon her side and breathed deeply under the influence of ether anæsthesia, the kidney moved at least 3 inches with every respiration; upon inspiration it shot downward with considerable force and slid along the posterior surface of the colon for about $2\frac{1}{2}$ inches, and on expiration it shot upward again, thus repeating this frictional action upon the intestine. It seemed clear that such traumatism would have an irritating effect upon the bowel; in the kidney it undoubtedly produced congestion, hypertrophy, and general thickening, the organ being almost twice its normal size, and yet without any evidence of interstitial or cortical disease. The capsule was split, the body of the kidney sutured to the fascia of the muscles as well as the two lips of the incision in the capsule, and the wound closed hermetically. Not a single complication or bad symptom followed, and

within one week from the time of operation the mucous discharges absolutely ceased, and there has not been a return of the same up to the present date, although the patient still suffers pain in the region of the kidney. A few local applications were made to the congested mucous membrane in the rectum and the sigmoid afterwards, but had nothing whatever been done to the lining membrane of the intestine, it is believed that the colitis would have been cured by the removal of this constant irritation. One other case of this kind has been seen since writing the above, in which Dr. Wyeth, on the author's advice, anchored a floating kidney and relieved the membranous colitis it caused.

Effort has been made to find some facts with regard to this feature of the disease, but literature seems to furnish nothing. This experience, however, may lead in time to the relief of a certain class of cases which have heretofore been signally intractable.

The occurrence of albuminuria and hæmaturia in connection with colitis has been observed by many practitioners. Thompson refers these conditions to the absorption of colon bacilli into the blood through the abraded mucous membrane of the colon. May they not be due to the inflammation produced in the kidney by its mobility?

In connection with these extra intestinal causes of colitis, attention may be called to the subject of abdominal aneurisms. In 6 cases observed by the author and his associate, Dr. Wellbrock, intractable mucous colitis has existed in connection with aneurisms of the aorta upon the level of the transverse colon. All of these patients have suffered from pain just above the umbilicus, constipation, flatulence, and reflex digestive disturbances. The crises ordinarily preceding the passages of mucus were absent in a large measure, and the rectum and sigmoid were less affected by hypertrophic catarrh than is usually the case.

It seems that the undue pressure of the aneurism upon the transverse colon and its interference with the solar plexus may possibly have something to do in the causation of colitis.

Pathology.—The fact that this is not a fatal disease accounts for the paucity of knowledge with regard to its pathological anatomy. Most of our information has to be drawn from the examination of the so-called membranes themselves, assisted occasionally by post-mortem examination of patients who have suffered from this condition, and yet died from some other cause. As these other causes are generally exhaustive diseases, such as nephritis, diabetes, pneumonia, and sepsis, it is difficult to determine their exact influence upon the chronic condition of the intestine, for it is well known that a certain kind of pseudo-membrane may be developed in the colon during the course of any one of these conditions. The membranes discharged are generally flakes, tape-like or some-

times tubular, that represent the caliber of the intestinal canal. Sometimes the tubes or tape-like masses are very extensive, measuring 2 or 3 feet; generally, however, they are only a few inches long. They are composed of a laminated albuminous material, structureless and devoid of fiber, and enclose in their laminæ small faecal masses, numerous bacteria, epithelial cells that have undergone fatty degeneration, crystals of cholesterolin and phosphates, a certain quantity of pus and leucocytes, and sometimes the whole epithelial lining of the mucous follicles. These shreds or tubes may be very thin or sometimes nearly $\frac{1}{4}$ of an inch thick, quite firm in parts, but shading off into a tenacious glairy mucus, which clearly indicates their nature. They are, undoubtedly, formed first by the secretion of this glairy mucus from the glands, which becomes coagulated in layers, the foreign substances and excoriated epithelium being caught in these laminæ as they are successively formed. Under the microscope these membranes appear structureless and transparent. "The inner surface of the membrane appears to be reticulated, and presents depressions or perforations which correspond to the mouths of Lieberkühn follicles." Epithelial cells are occasionally grouped around these openings, showing that the lining of the follicle has been cast off and become incorporated in the membrane. Sometimes these are larger than the normal follicles.

The muscular walls are generally thin and atrophied. The veins are often dilated. At certain spots or areas there are congestions and excoriations of the mucous membrane; the latter are bright-red in color and present the appearance of shallow ulceration. The glandular and submucous layers of the intestine are hypertrophied, distended with mucus, and the epithelial cells appear to be undergoing fatty degeneration. There is no diminution in the caliber of the gut, but throughout its extent there is an hypertrophy of the follicles and glandular layer. The fact that the membrane is very rarely found post mortem shows that it is not retained in the intestine for any length of time after its formation. When it has been found, it has been confined to a limited area, was very easily detached, and ulceration has been very rarely seen beneath it. The question, however, which is of great interest in regard to these conditions is the fact that the passage of this mucus should be preceded always with such severe tormina and griping pains and yet be unaccompanied, so far as post-mortem examination shows, by any severe lesion in the wall of the gut. There is no reason why a simple increase in the secretion of mucus and the passage of an unirritating soft mass of membrane should be preceded or accompanied with severe pain. These masses are no larger, no firmer, no more adherent, and no more irritating than the ordinary faecal mass. If it is true, as the pathologists tell us, that there is no ulceration nor particularly active inflammation at the points upon

which these membranes are formed, it seems impossible to account for the pain through any inflammatory process. Thompson states that this condition is probably due to some particular bacteria, which may cause the pain. If such was the case, some form of bacterial organism would have been found more or less constantly present in the discharges of membrane and mucus which have been so carefully examined by pathologists in the last few years. The only explanation of these pains that seems practical lies in adhesions, temporary volvulus or intussusception. The fact that the faecal passage sometimes precedes the passage of mucus does not contraindicate these conditions; it only signifies that the peristaltic action of the gut below the intussuscepted portion carries whatever faecal matter there is in that part of the bowel downward, and produces a movement without giving relief. The irritation produced in the mucous membrane by intussusception or volvulus may cause a hyperaemia and localized inflammation with increased secretion of mucus, which, being retained, becomes thick, tenacious, and membranous. When the intussusception relaxes, or the volvulus untwists, this mucus or membrane is passed rapidly downward and out through the rectum. The patient generally attributes his relief to the passage of mucus, but it seems more rational to ascribe the relief to the relaxation of spasm in the intestine at the point of constriction.

The mucous membrane of the rectum and sigmoid flexure in colitis is always congested, sometimes slightly ulcerated, thickened, and secretes more or less mucus. The author had under his care a physician who had suffered from this condition for a long period; the pseudo-membrane in his case was seen frequently through the sigmoidoscope attached to the mucous membrane of the sigmoid flexure, and was wiped off with pledgets of cotton, a part of it being membranous and the rest gelatinous. There was undoubtedly a prolapse or intussusception of this portion of the intestine into the upper rectum in his case, and when he suffered from his acute attacks, if a long Wales bougie was passed sufficiently high and water injected to distend the sigmoid, the tormina ceased, and his pains were relieved; moreover, if these bougies were passed regularly, almost regardless of what medication was thrown in, the attacks could be almost entirely averted. This case and several similar ones have led to the conclusion that this intussusception is the principal cause of pain.

Symptoms.—The disease generally occurs between the ages of twenty and fifty. Some cases have been observed under ten years of age, and others in those over fifty, but these are exceptional. It occurs in thin, anæmic, hypochondriacal individuals, as well as in the well-fed, rotund, and plethoric. The symptoms are chronic intestinal indigestion with flatulence, capricious appetite, and a tendency to melancholia or mental depression.

Constipation is the rule, the faecal mass often being in little, round, hard balls, and coated with mucus; though this condition may alternate with diarrhoea. The diarrhoea is due to the irritation produced by the lodgment of small, hard masses in the saccules or diverticuli of the intestine. The fluid faeces produced by this cause or by cathartics pass over or around these masses and leave them *in situ* to continue the irritation. The patients are generally sensitive to cold, attributing this condition to imperfect circulation; the tongue is slightly furred with a whitish coat, and the abdomen is generally more or less distended with gas. White states that these patients sometimes have cystitis and pass mucus with the urine. He quotes Da Costa as saying that they are frequently the subjects of boils.

The mental depression and intestinal symptoms, while more or less present at all times, have periods of exacerbation in which there is absolute lack of appetite, great distention with gas, griping abdominal pains, and increased constipation. After hours or days of suffering in this manner a mass of membrane or mucus is discharged from the bowel and the griping ceases, but the pain and soreness remain for several days. In severe cases these passages of mucus and membrane may continue daily for a long time. Ordinarily they are not mixed with blood, but sometimes bright blood passes with the membrane. White reports a case in which this condition continued for several weeks; the patient was so weakened that he gradually sank and died. The author has seen 1 case in which $\frac{1}{2}$ a pint of this mucus was discharged every day for a like period, but there was no blood; she had very little griping or pain except at periods two or three days apart. In other cases in which the discharge of mucus and membrane was very limited, the pains and exhaustion have been very great. This exhaustion after the passage of the mucus and membrane is one of the typical symptoms of the disease; the patients are utterly collapsed, sometimes unable to sit up until hours after the stool; they gradually lose strength and color, and become sorrowful and depressed, with forebodings and fears. Their natures are greatly changed; this is probably due to the fact that they suppose their ailment to be of a much more serious nature than the physicians deem it to be. Authors have laid stress upon the existence of urates and uric acid in the urine as indicating a rheumatic or gouty origin of the disease; this is believed to be erroneous.

There is no relationship between eating and the periods of pain and griping; sometimes these occur just before taking food, sometimes immediately afterward, and sometimes at remote periods from it. Insomnia is quite frequent; whether it is due to the disease itself, to the pain, or to the mental anxiety concerning it, is a question very difficult to answer. A confused state of the intellect is not infrequently present and due prob-

ably to auto-intoxication, anxiety, and brooding. The symptoms may remit and the mucus cease to be discharged; then they recur with increased virulence and continue for varying periods, to disappear and recur time after time. Only those cases can be said to be positively cured which are proved to have been due to some reflex or local cause which has been absolutely removed; and even in cases where the appendix has been at fault and has been removed, there have been occasional mild recurrences of the disease. As is stated by Glasgow (*Journal of the American Medical Association*, 1901), it is essentially a chronic disease, very seldom fatal, but of great annoyance to its victims.

Treatment.—From what has been stated in the preceding pages, one can readily understand that there is a very great diversity of opinion with regard to the treatment of this condition. By those who hold that it is simply a neurosis, nothing more is advised than general tonic and sedative treatment directed to the nervous system or the mental condition. Change of residence, travel, baths, amusements, nerve tonics, electricity, etc., compose the lines of treatment which are laid down by those who adhere to this pathology. To those who believe that it is simply a question of chronic constipation, some method of emptying the bowel, and keeping it so, associated with those means which go to restore the nervous and physical tone of the individual, are all that is necessary. The length of time, however, required for the treatment of these conditions by the means and methods of these two schools, and the numerous failures of such treatment to improve the condition even temporarily, speak volumes against the correctness of any such theories. The etiology which has been advanced in the preceding pages differs so materially from these that it involves an entirely different line of treatment. If this condition is due to intussusception, adhesions, reflex influences, such as appendicitis, floating kidney, enteroptosis, or malpositions of the reproductive organs in women, the treatment consists in determining as far as possible which one of these conditions is responsible, and remedying that if feasible. Nearly all the authors who write upon this subject agree that there is a congestion or catarrhal hyperæmia of the mucous membrane associated with swelling of the glandular and submucous layer at the points upon which these membranes or mucous shreds have been found. Those who have examined the rectum and sigmoid have verified the author's observations of the fact that there always exists a certain amount of hypertrophy and hyperplasia in the mucous membrane of these organs; whether this condition is primary or secondary to the membranous colitis it is very difficult to say, though the latter view seems most tenable, because the rectum and sigmoid may be restored frequently to their normal condition by persistent and well-directed local treatment, and yet the condition will recur, unless the colitis above has been cured at the

same time. Glasgow (*loc. cit.*) states that while a large number of these cases are due to appendiceal inflammation, they may be treated by therapeutic measures and the colitis cured. He advises the use of ichthyol internally in 3- to 5-grain doses three times a day. The author had used this remedy in connection with 3 of these cases for a period of about one year previous to the publication of Glasgow's paper; the drug is not a specific, but it is a useful adjuvant to other lines of treatment. So far as the appendix is concerned, the radical removal of this appendage whenever and wherever there is any evidence of inflammation or adhesion about it is advisable. Medical treatment is useful for the time being, but its results are not permanent. A catarrhal appendix with just a little bit of tenderness, no temperature, and slight elevation of the pulse, is a dangerous appendage. The part does not drain well, is likely to become infected at any time, and keeps up reflexes sometimes, such as membranous or mucous colitis and functional disorders of the digestion, for years. Such appendices should be removed at once, and in the majority of instances the melancholic, anæmic, and dyspeptic patients, who are supposed to be the victims of neurotic colitis, will immediately begin to improve.

The influence of floating kidney upon membranous colitis is a matter upon which an expression of very positive opinion is not at present advisable. In a series of 12 cases published by Dr. Einhorn, in all of which there were digestive troubles and membranous colitis, 8 of them suffered also from floating kidney upon the right side. In the author's observations 6 cases of membranous colitis have been afflicted with very mobile right kidneys. The amount of mobility in the kidney does not seem to be in proportion to the irritation which it produces. Those kidneys which float loosely around in the abdomen, sometimes descending almost to the pelvis, seldom give their possessors very much annoyance; whereas the kidney which slides up and down between the posterior abdominal wall and the ascending colon, moving some 3 or 4 inches downward with every inspiration, and upward on expiration, have been the most annoying form of this condition, and it is the only form in which there was any marked degree of membranous colitis.

It is not proposed to describe here the methods of removal of appendices or of fixation of floating kidneys; but it is suggested that when no other cause for colitis can be determined, and when there is a positive diagnosis of either one of these conditions, surgical intervention may, and probably will, result in the relief of the intestinal symptoms. Operative measures should be preceded by appropriate therapeutic treatment, but it is not believed that these remedies should be persevered in for indefinite periods unless some improvement in the symptoms is observed.

The therapeutic measures advised are: First, the absolute cleansing

out of the intestinal canal. The fact that saline laxatives produce large and copious watery defecations does not by any means prove that the intestines have been thoroughly cleansed; one may be more confident of a proper cleansing of the intestinal canal when the patient has moderately soft, smooth, well-formed fæcal passages. Fluid movements easily pass over hardened fæcal balls retained in the diverticuli of the intestinal wall, and these balls may be left there for weeks and months to act as constant irritants, while the patients are daily having semifluid movements from the use of saline laxatives. Wylie has suggested the use of equal parts of glycerin and castor-oil as a laxative in these cases, giving a tablespoonful of each three times a day, and continuing this for two or three weeks; he says that so far from its producing diarrhoea, it only keeps up a smooth, easy movement, sometimes semifluid, and is the most successful means to remove the hardened fæcal masses which accumulate and lodge in the folds of the colon; this combination has been used by the author in varied proportions, but never so protractedly as Wylie recommends. The daily administration of a moderate dose of malt and cascara acts practically in the same manner. This, with massage of the colon and lavage through the long rectal tube, has succeeded generally in the removal of all these accumulations. The use of a cannon-ball weighing about 5 or 6 pounds, and covered with chamois skin, is very advantageous for massage; this is used by the patient every morning; beginning at the cæcum, it is rolled upward over the ascending colon, across the transverse, and downward over the descending colon time after time. It acts mechanically, and also by stimulating peristaltic action.

At night, before the patient retires, it is a good plan to inject through the long bougie, or, if this is impossible, by slow instillation through a fountain syringe, a mixture of cotton-seed or sweet-oil and glycerin into the sigmoid flexure; the quantity of this to be used depends upon the ability of the patient to retain it; some take only 4 or 5 ounces, while others retain 1 to 2 pints. This should be administered in the knee-chest posture, and injected very slowly in order that it may find its way as high as possible. The patient should lie with his hips elevated and his head low down for half an hour after the injection is given, and if possible he should retain the mixture all night. In the morning his bowels should be moved by a cold-water enema, if necessary, and a regular time should be established for this procedure. After this 1 pint of a 5- to 10-per-cent solution of the aqueous fluid extract of *krameria* should be injected through the long Wales bougie. *Hydrastis* and *hamamelis* are also useful for this purpose, but not as good as the *krameria*.

The diet is of the utmost importance, and, contrary to the ordinary practice in these cases, that recommended by Von Noorden has been found to act best. This consists of meats in abundance—beef, mutton,

fowl, fish, eggs, and anything of the nitrogenous type are admissible; of vegetables—the leguminous varieties, together with those of a fibrous nature, such as spinach, asparagus, celery, etc.—may be allowed. Starches, sweets, coffee, tea, and alcohol should all be avoided. As to bread, either Graham or whole wheat bread, as distinguished from those made from finer flours, are the best to use. Corn-bread is much relished by these patients, and does not seem to have any ill effect when made without sugar. All wheat breads should be used stale or toasted to avoid the fermentative action of improperly cooked yeast. The condition of achylia reported by Dr. Einhorn has not been met with, and it can only be said that when there are evidences of stomachic indigestion, of whatever type it may be, it should be attended to according to approved methods.

Therapeutic remedies seem to have little or no effect except to relieve the symptoms temporarily; pancreatin, boric acid, ichthyol, and salol are probably the most satisfactory drugs, and they are used when there are flatulence and evidences of fermentation. Tonics are indicated in those cases in which there are feeble circulation, anæmia, and general debility, but iron is contraindicated on account of its constipating effects. Drugs which stimulate the appetite and assist in assimilation seem to have a good effect. Feeding with the proper character of food, however, is the one essential indication. As Da Costa pointed out nearly thirty years ago, the milk diet does more harm than good. Where there is marked local inflammation in the rectum and sigmoid, with excoriation or ulceration, local treatment to these conditions should be carried out after the methods described in the chapters on proctitis and ulceration of the rectum.

Outdoor exercise and mental and physical occupation are essential to the cure of these patients, especially those with marked depression and a tendency toward melancholia. A change from a low, damp climate to high, dry, mountainous areas is frequently of benefit. This, however, is not essential, as the condition is a local one due to direct or reflex irritation, and when these exciting causes have been removed the mucous and membranous discharges will cease, the patient will begin to ingest and assimilate proper quantities of food, and through this the anæmia and general physical debility will be removed.

Secondary Membranous Colitis.—This term is given by Hale White to those conditions in which a membranous deposit forms upon the walls of the colon secondary to some other grave and constitutional disease. There are rarely any symptoms of the condition during life beyond a certain amount of tenderness over the region of the colon and sigmoid. There is scarcely, if ever, any discharge of mucus, and diarrhœa, if there be any, is generally of the involuntary type. The disease is therefore not a local condition, and as it presents few symptoms referable to the

lower end of the intestinal tract, its full consideration here would be out of place. Occasionally, however, in the course of such diseases rectal symptoms develop; blood, pus, and mucus are discharged, and the rectal specialist is called in to determine the nature of the condition. It seems advisable, therefore, to refer briefly to the causes of this condition, and those readers who are interested in the subject can follow it up in the journal literature and in works upon general medicine.

First, these membranes may arise from traumatism to the colon, or from swallowing some corrosive substances, especially toxic doses of mercury. The explanation of this, as given by Virchow (*Berlin. klinische Wochenschrift*, 1887, No. 50) is, that the mercury is absorbed through the stomach and small intestines and excreted into the colon, thus forming an irritation or inflammation which results in the production of the mucus or so-called membrane.

Second, this condition may be due to sepsis; patients with acute septicæmia in which the whole constitution is involved in the toxic process, with great debility, impaired circulation, and low vitality, are all subject to this disease. The colonic symptoms occur late in the affection, and the membranes formed are rarely, if ever, passed during life. White cites a number of instances in which these membranes were found post mortem; among them a case of gangrenous umbilical hernia; 1 of fatal puerperal fever; 1 of septicæmia due to premature labor or abortion, in which dark-green patches of membrane were located near the sigmoid flexure; another of general sepsis with gangrene of the foot, in which there were grayish leathery membranes formed in the rectum and sigmoid flexure; another of sepsis and general cystitis, in which the membrane began just within the anus and extended for 3 inches upward as a grayish-brown coagulation with necrosis and submucous hæmorrhages extending as high as the splenic flexure, and finally, one of acute suppurative cellulitis of the neck with whitish patches in the ascending colon.

There is nearly always some involvement of the kidneys in these conditions. Constipation is more frequent in these cases than diarrhœa. If general peritonitis exists there will be tympanites, and sometimes anasarca. The author has seen the condition once in a case of gangrene of the leg followed by general septicæmia, three times in cases of empyema with symptoms of general sepsis before death, and once in septic peritonitis following operation in a case in which a large tubal abscess broke into the peritonæum.

Third, secondary membranous colitis may occur in cases of chronic Bright's disease; both simple and ulcerative inflammation of the rectum and sigmoid result from this disease. Wilks and Moxon state that they observed the formation of a tough whitish membrane attached to the mucous membrane of the colon in patients who died from this condition, but

they do not state whether there was any suppurative inflammation of the kidneys or not. Bristowe and Delafield both state that these inflammations of the colon may occur in the late stages of fatal pneumonias. White has seen cases occur during the course of fatal diabetes, and Pye-Smyth has observed it in a case of carcinoma not connected with the intestine. The fact that the condition does not present symptoms during life, that it is rarely observed except at autopsies, and that all the cases in which it has been observed, except, perhaps, in a few following mercuric poisoning, have proved fatal, renders a discussion of the treatment impossible at the present time.

Ulcerative Colitis.—Ulceration of the colon frequently occurs as a result of Bright's disease, typhoid fever, tuberculosis, dysentery, and malignant neoplasms. It is frequently found in the post-mortem room after death from other causes in patients who present no ante-mortem symptoms of the condition, and whose intestinal functions, so far as their history showed, appeared to have been perfectly normal up to within a short time before death. It is not proposed to discuss here the condition that arises from these specific causes, but to study those cases of simple ulcerative colitis with chronic diarrhœa and symptoms referable to the rectum and lower end of the intestinal canal.

Etiology.—The cause of ulceration of the colon can not always be told. In some cases there is a history of typhoid fever, dysentery, or chronic diarrhœa; sometimes it develops during the course of a membranous colitis, at others the condition seems to originate suddenly and without any premonitory symptoms. It is said to occur frequently in the insane. Campbell (*British Journal of Mental Sciences*, 1898, p. 526) reported 28 cases that occurred in the institutions for the insane with which he was connected. Cowan, Ackland, and Targett claim that ulceration of the colon may be due to the disease of the central nervous system, and White has reported 2 cases that occurred in Guy's Hospital which seem to corroborate this view.

Cowan calls attention to the frequent occurrence of ulceration of the rectum and colon in the insane. Eurich (*Lancet*, May 18, 1895), while admitting that this is the fact, states that the lowered vitality of lunatics renders them an easy prey to all sorts of diseases. He therefore believes that these ulcerations are not due to trophic neuroses, as Ackland and Targett claim, but to some other cause that operates upon these weakened systems.

Age seems to have some influence in producing it. In 28 cases reported by White and Coleman, seventeen years was the youngest and fifty-nine the eldest. In the autopsies at the New York city almshouse ulcerations of the rectum and colon are among the most frequent pathological changes. Many of these have been due to tuberculosis or to

atheromatous changes in the blood-vessels. The condition extended in patches from the rectum to the cæcum.

Sex seems to have no predominating influence. In White's cases there were fifteen men and thirteen women.

Climate and occupation have not been shown to have any decisive influence in the production of the disease; in mild climates it occurs quite as often as in the warmer regions, and even in the very cold sections of Russia and the high mountainous regions of the United States this condition seems to be quite as frequent as in the other sections. Laborers in lead works, and miners who have considerable to do with quicksilver and mercuric preparations, seem to be affected with the disease somewhat more frequently than those engaged in other industries. The question whether the absorption of the metals occasions this, or whether the constipation produced by these occupations is the cause of the ulceration, remains yet to be answered. The fact that the disease occurs most frequently in anæmic, broken-down individuals suffering with some other form of disease, or having suffered from some exhaustive condition, makes it likely that these ulcers are due to trophic or circulatory changes. On the other hand, they may be due to the invasion of weakened tissues by the septic bacteria always present in the colon. As a matter of fact, it is now generally believed that there are present in the human system at all times the elements of sepsis and toxæmia, and that it is simply a question of perpetual war between these elements and the animal tissues. When the system is in a normal, strong, and healthy condition it resists the invasion of these bacterial enemies. When it is weakened by improper nourishment, overwork, anxiety, or disease, the balance is thrown to the other side, and the invasion of septic bacteria becomes effective in the production of disease. Such may be the cause of these ulcerations in the rectum and colon. The balance is thrown upon the side of the bacteria.

There is often a history of some organic disease of the heart, liver, kidneys, or spleen, but Hale White says in one-half of the cases the rest of the organs are perfectly healthy. Rheumatism with its cardiac complications, gout with its thickened and calcareous joints, hepatitis with abscess and biliary disturbances, and, most frequently of all, diabetes and chronic Bright's disease, are associated with this form of colitis. Campbell (*loc. cit.*) found chronic Bright's disease in 11 out of 28 cases of ulcerative colitis, and 8 out of 18 cases of membranous colitis. Cowan reports a similar state of affairs in the institutions over which he has control. The author has seen 2 cases of the disease in which there was marked diabetes, and in 1 the glycosuria amounted to 6 per cent. Yet the very large number of all these diseases that are not associated with ulcers of the colon renders the conclusion necessary that they are not

exciting but rather predisposing causes to the condition. This is throwing us back once more upon the theoretical conclusion that the disease is due to the invasion of specific bacilli under the circumstances favorable to their excessive development.

Pathology.—Much has been written and said about the pathology of ulcerative colitis, and yet there seems to be very little harmony of opinion with regard to the same. The ulcers may be found anywhere from the anal margin to the tip of the appendix, even this latter organ being sometimes involved. Their depth and extent are very variable, at times being the size of a split pea, at others being as large as a silver quarter, and gradually sloping down to the base; occasionally they involve the entire circumference of the colon. The muscular wall of the gut usually forms the base of the ulcer, but sometimes they are superficial and may not extend to the submucous tissue; in other cases they penetrate the muscular wall and even the peritonæum, but usually this membrane is healthy over the seats of the ulcers. The mucous membrane between the ulcerated areas is dark, purplish, and congested.

The tendency of ulcers is to extend circularly around the intestine. They may be so numerous, however, that only small patches of mucous membrane remain, which patches White describes as having a sort of polypoid appearance, and even having been mistaken for polypi. He reports a case in which there were over one hundred superficial ulcers; the author has recently seen a similar case in which there was scarcely a square inch of mucous membrane between the anus and the cæcum. Omerod and Barlow reported cases in which there were numerous perforations at one time. Delafield stated that the follicles are infiltrated, swollen, and break down, forming what he terms "productive ulcers," which from his descriptions closely tally with those referred to here. The early ulcers seem to develop either along the lines of the mesentery or of the longitudinal folds. The epithelium of the Lieberkühn follicles is clouded and swollen; there is an accumulation of small cells in the submucous layer which is oedematous and thickened, and thus narrows to a certain extent the caliber of the gut. The follicles may be the seat of ulcers or they may be cut off flush with the ulcerated surface, leaving a portion of them below this surface.

Symptoms.—The disease may begin in a variety of ways. Delafield states that in the large majority of instances it begins in the rectum and travels upward. White says that it may begin at any point in the whole course of the large intestine. In some cases there is a sudden onset of sharp lancinating pains in the course of the colon attended with griping and a tendency to frequent movements of the bowels. These pains last for a short while, disappear, and the patient may feel nothing more of the kind for several days or weeks, when they occur again. They last

sometimes an hour or more, at others they continue for two or three days. The stools do not at first contain any mucus, pus, or blood, but if the pain is persistent, and the recurrence frequent, there will be evidences of ulceration in the discharge of these substances. If the ulcer is high up the blood and pus will be mixed with the stool, and the blood will be dark and decomposed or clotted; if it is in the lower part of the sigmoid flexure or in the rectum, the blood will be fresh and will precede the stool. The periodical occurrences are said by White to be typical of the disease. The pain, which in the first attacks is not very severe, increases with each recurrence. The amount of pain bears no relationship to the amount of ulceration, nor is it influenced by the ingestion of food. The cause of pain is probably not in the existence of an ulcer, but in the irritation of the ulcer by the intestinal contents, which sets up irregular peristaltic or spasmodic action of the bowel. The number of the stools varies greatly; in one case there were 35 to 36 stools a day for one week during the acute attack, in others the number reached anywhere from 5 to 15 or 20 stools a day. The diarrhoea may alternate with short periods of constipation. A distinction between the diarrhoea in these cases and that in dysenteric and acute catarrhal inflammations of the rectum and colon should be clearly understood. In the latter conditions there is a constant tenesmus and desire to go to the water-closet, a feeling of incompleteness in the defecatory act, a desire to remain straining upon the seat. In this condition, however, the inclination is not continuous. It is frequent and imperative at the time. The bowels having once moved, there is complete relief for the time being. The patient does not suffer in the interim, but after a while the imperative demand recurs, and must be yielded to at once. The stools may be thin and watery, or they may be semifluid. Sometimes hard faecal balls, as in mucous or membranous colitis, occur, but this is not the rule. They are generally semifluid and possess a foul, feculent odor, which is often very suggestive of malignant disease. Mucus is not generally present, but, as said above, blood and pus soon begin to appear in the stools. When the blood occurs as a clot, it is sometimes smooth on one side and rough on the other, showing that it has recently been detached from the floor of an ulcer (White). Along with the blood and pus there may come shred-like masses of sloughing material containing leucocytes, epithelial cells, and small adherent masses of faecal matter.

Vomiting is said to be an early symptom in the disease, but in the author's experience it has only occurred in occasional and in very severe attacks. When the nausea and vomiting are very severe blood may be contained in the vomited material, but this is generally due to the rupture of some small venule in the throat or œsophagus, and does not come from the ulcers of the intestine. The tongue is at first

coated with a white furry coat, but it soon becomes red upon the edges and more or less brown in the middle, very much resembling the tongue of typhoid fever. The patients suffer greatly from thirst. Progressive anæmia, loss of flesh and strength, and great depression in spirits are the natural sequences of the disease. The temperature in the disease is very irregular; in some cases it never goes above 100° F. during the whole course of the malady, in other cases the temperature has gone as high as 104.5° F., and may vary at times 4 degrees between night and morning. It sometimes drops below normal, and within a few hours is up again some 3 or 4 degrees. The condition resembles very closely typhoid fever with ulceration of the bowel.

The course of the disease may be very short, patients having died from it in three or four days. Such a result, however, is probably due to perforation and subsequent peritonitis. Under other circumstances death from ulceration occurs after long periods of suppuration and general sloughing of the mucous membrane of the intestine, and it is then due to exhaustion or amylaceous degeneration of the organs. White states that the prognosis is always grave, and that he is exceedingly doubtful in any case that recovers whether after all the diagnosis was correct. The course, he says, is fatal in about eight weeks. Continuous high temperature, persistent pain, tympanites, and very frequent stools associated with the loss of blood and increased purulent discharge, are all unfavorable symptoms.

Diagnosis.—It is likely to be confounded with but three conditions, viz.: dysentery, typhoid fever, and malignant disease of the large intestine. Reference has been made to the distinction between dysentery and typhoid fever and this disease. In malignant disease the onset is very much more gradual, the temperature is never high except in the very last stages, the patient is not troubled with griping or diarrhœa, but generally with constipation that requires cathartics to move the bowels; after the movement has once been obtained, the patient seems fairly comfortable for some time, later on the passing of mucus and blood are indicative of malignant disease. One who is thoroughly versed in the examination of malignant diseases of the intestine will rarely be deceived by anything else, for the peculiar feculent, pathognomonic odor from malignant ulcers is characteristic. In ulceration of the colon there is rarely any discharge of glairy mucus, but the sanious pus is very abundant.

Treatment.—So far as any local influence of medication goes, no definite results seem to have been obtained in these cases by administration through the mouth. The chief indication seems to be to find out the cause of the debilitated condition of the system and treat that as far as possible. The ulcerated colon and rectum themselves need

local treatment together with a bland, unirritating diet in order to prevent further irritation and multiplication of the ulcers. Ordinary irrigation of the rectum through the rectal irrigator is of no practical benefit in these cases, as the fluid does not reach high enough. The use of long bougies, even of the soft-rubber type, is dangerous, because the rectal wall at the ulcerated spots is liable to be so thin that even the slightest distention or pressure may rupture it and set up a fatal peritonitis.

The treatment that affords the most benefit is this: Place the patient in the semiknee-chest posture by elevating the hips upon two or three pillows and letting the shoulders, chest, and knees rest upon the surface of the bed; in this position introduce the rectal tip of an ordinary fountain syringe into the rectum; elevate the fountain only about 2 feet above the level of the patient, and then turn on the stream and let the fluid find its way into the colon. By requiring the patient to remain in this position for ten or fifteen minutes, breathing gently but deeply, the fluid will gradually pass into the intestinal canal so slowly that there is no danger of distention and very little tendency of the bowels to reject it. The fluid should be started at about 105° or 110° F., as it will gradually cool off during the slow instillation. By this means it is possible to reduce the frequency of the stools, to check the discharge of blood, and together with proper regimen, diet, and tonic medication, to restore the patients to health. The fluid injected has been one of two remedies: either the aqueous fluid extract of *krameria*, which seems to act better than anything else so far as checking the diarrhœa and hæmorrhage is concerned, or the fluid extract of *hamamelis*. The strength of these solutions depends largely upon the condition of the patient and the sensitiveness of the colon; in some cases the *krameria* may be used as strong as 20 per cent, in others it may be used in the strength of 5 per cent. *Hamamelis* is not used stronger than 10, and generally in from 1- to 3-per-cent solutions. The amount of the latter used varies from 1 to 6 pints, and the patient is required to retain it as long as possible. When the hæmorrhages are frequent, in the commencement of the treatment a combination of ergot, cinnamon, and *hydrastis* may be used internally; gelatin has been recently advised for this purpose, but the author has had no experience with it; by the combination of these remedies with the irrigation mentioned above the hæmorrhages may be checked very promptly in all the cases. The ulceration, however, is a more obstinate affair, and its cure depends not only on keeping the intestine free from irritating substances and washing out the septic germs, but also upon building up the patient's general condition. Stimulation of the assimilative organs and the ad-

ministration of predigested and nourishing foods are of the utmost importance. Bone marrow, hæmaboloids, protonuclein, fresh beef juice, plasmon, and such remedies are used in small quantities and frequently, together with a sufficient amount of rich Burgundy wine as a stimulant to the heart and digestion. When these local and general measures fail recourse may be had to functional rest of the parts by making an artificial anus above the ulcerated portion. Thus far the author has not found one whose condition would admit of it who would give his consent to having a right inguinal anus made. So long as they are not desperately ill the patients cling to the belief in medication and local treatment without operation. White holds that when the disease shows no inclination to heal by local treatment, a right-side inguinal colotomy is not only justifiable but imperative. He recommends the injection of a 25-per-cent solution of perchloride of iron as high up in the colon as possible, in order to control hæmorrhage; but the author has elsewhere expressed his objections to this remedy, and need not repeat them here. Delafield, Da Costa, W. H. and W. K. Thompson all advise the use of castor-oil in small doses for the relief of diarrhœa. The author has tried it many times and finds its action very uncertain; sometimes it seems almost a specific in the early stages of the disease, while in others it seems absolutely useless, so that he has come to doubt its efficacy in true cases of ulcerative colitis.

Follicular Colitis.—Scattered throughout the mucous membrane of the rectum, sigmoid, and colon, there are a large number of solitary follicles, upon the function of which physiologists fail to throw any light. They are not glandular in their structure; they are neither secretive nor absorptive. They are much more frequent in the colon than in the sigmoid and rectum. Their seat is in the mucous membrane proper, but their bases dip down into the submucous tissue. During the course, or as a result of chronic catarrhal inflammations, these follicles become inflamed, the pressure upon the membrane above them results in a necrosis, and small, well-defined, circular ulcers are left.

White states that this disease occurred about once in five hundred post mortems made at Guy's Hospital, London. In a large number of autopsies made at the New York City Almshouse during the last six years only 3 cases of this condition have been observed. Notwithstanding the fact that White says the condition is never diagnosed during life, the writer has seen and recognized 5 cases of this kind in his clinic and private practise. In 2 of these the disease was chiefly in the sigmoid, in 2 it was just below the recto-sigmoidal juncture, and in 1 it was at the lower end of the rectum.

Etiology.—The cause of this condition is very imperfectly known.

It occurs during the course of, or as the result of, other inflammatory diseases. Holt reports having seen the condition 20 times in 70 fatal cases of non-tubercular diarrhoea in infants; he states that it never occurred in cases of less than one week's duration, and it was more frequent in those that lasted longer than eight or ten weeks. In the 20 cases the ulcers were confined to the colon in 15, to the small intestine in 2, and were found in both 3 times. Those which were found in the small intestine were in the lower end of the ileum near the cæcum. Those in the colon were most frequent in the sigmoid flexure, the lower portion of the descending colon, and the rectum. In the cases reported by White all of them are said to have died from some other disease, such as dysentery, cancer, membranous colitis, typhoid fever, or tuberculosis. He calls attention to the fact that in the 5 cases which died from tuberculosis and in which he found follicular ulceration of the colon, there was not a single instance of tubercular ulceration of this organ.

In the cases observed at the almshouse 2 were in tubercular patients and 1 in a case of chronic ulceration of the colon. In the tubercular cases the autopsies confirmed the statement of White, and in the other case the follicular ulcers were dotted here and there between the larger ulcerations. In none of these cases were any tubercle bacilli or giant cells found in the ulcers. In the author's clinical cases 2 gave a history of having had "acute dysentery," which had resulted in a chronic diarrhoea, with hard, lumpy stools occasionally; upon examination there were evidences of typical hypertrophic catarrh. In another there was obstruction in the sigmoid and colon which, upon exploratory laparotomy, proved to be due to adhesive bands. These were broken down, and under rest, proper diet, and sigmoidal irrigation the condition disappeared. In the fifth case, in which the inflammation was centered around the lower portion of the rectum, there was a history of chronic constipation, operations for hæmorrhoids, stretching of the sphincter, and much instrumental interference with the organ. All of these cases, therefore, were associated with or followed some inflammatory process in the walls of the intestine. So far a case of simple, uncomplicated, follicular inflammation of the colon or rectum has not been met with.

Pathology.—The pathological changes in this form of inflammation consist in a congestion of the mucous membrane around the follicles with hyperplasia and an accumulation of small, round cells inside of them (Fig. 87). As this increases the follicle becomes distended and elevated above the level of the mucous membrane. Pressure from this distention and friction from the passage of the faecal mass over it cause necrosis of the epithelial covering and rupture of the wall of the folli-

cle. This leaves an ulcer with sharply cut edges, slightly undermined, and with a flat base, never crater-like. The ulcers are not deep, and rarely coalesce, although the whole gut may be honeycombed with them (Fig. 88). They vary in size from a hemp-seed to a split pea.



FIG. 87.—TRANSVERSE SECTION OF INFLAMED FOLLICLE.

White and Holt state that they show no tendency whatever to heal, but in the fifth case, mentioned above, and in which the affected mucous membrane was removed, there were several cicatrices which seemed to have originated in follicular ulcers that had healed. So far no case of perforation of the gut from this condition has been recorded.



FIG. 88.—GROSS APPEARANCE OF MUCOUS MEMBRANE IN FOLLICULAR COLITIS (Delafield and Pruden).

Gaylord and Aschoff (Pathological Histology, p. 168) have observed a condition which they denominate "*colitis cystica*"; it appears to be very similar to follicular colitis. They state that in chronic inflammations of the colon the mucous membrane is studded with minute, clear vesicles which are produced by dilatation of the gland lumina, the

openings of which have become occluded. Chronic irritation of the mucous membrane, they claim, causes agglutination of the mouths of the glands, and the continued secretion of the glands thus closed results in small spherical cysts which project above the surface of the gut. The clinical symptoms and macroscopical appearances described by these authors coincide with those of follicular colitis. The pathological changes, however, and the manner in which the cysts are formed differ materially from those ordinarily described in this disease. It remains to be determined, therefore, whether this is another disease or a new pathology for the old one. The author recently removed a small spherical mass from the rectum the histological examination of which seemed to point to the latter view.

Symptoms.—The symptoms in these cases are very similar to those of chronic inflammation of the rectum and colon, and vary according to the site of the affection. Where the disease is found in the sigmoid flexure and colon the symptoms are those of chronic hypertrophic catarrh. When it occurs below the recto-sigmoidal juncture the patients suffer chiefly from muco-purulent discharges, frequent desire to defecate without any results, tenderness over the lower end of the spine, and vague pains shooting down the legs.

In the case in which the disease was limited to the lower end of the rectum the patient's symptoms were those of ulceration of the rectum and anus. She had already had an operation for hæmorrhoids four months previous to consultation for the new condition. The wound from this operation had not healed, and there remained a chronic ulceration in the anterior left quadrant of the rectum. The patient had frequent painful movements composed of pus in abundance, some mucus and blood. Every two or three days she passed small balls of faecal matter, which became coated with the contents of the rectum through which they passed. The ulcer in this case practically obscured the symptoms of follicular disease, and the diagnosis was made solely upon ocular examination. The condition was so marked that its benign nature was doubted; all the affected mucous membrane was excised and submitted to the pathologist for examination.

Pathological Report by Dr. F. M. Jeffries:

"The macroscopical appearance is as though the mucosa were thickly beset with miliary tubercles. Each nodule is round, projects slightly above the surface, and is yellowish in color. So numerous are they that each appears to be in contact with its neighbor. The submucosa and muscular coats appear to be unaffected and devoid of induration.

"Microscopically the mucosa is beset with solitary follicles or small masses of lymphadenoid tissue that resemble in all respects, except numbers, the normal solitary follicles.

"Between the follicles the crypts of Lieberkühn are normal, as are also the submucous and muscular coats.

"At one point where tissue was selected for microscopical examination, granulation tissue was observed associated with the submucosa—probably the site of a previous operation."

All of these cases suffered from flatulence and digestive derangements; they found little relief from the use of laxatives and remedies for indigestion. In one case the patient suffered with the most aggravated symptoms, such as alternating diarrhoea and constipation, discharges of pus with thin mucus, followed by extreme exhaustion and tenderness all over the abdomen. Upon laparotomy, adhesive bands were found which produced a constriction of the gut; these were broken down and the bowel released. In the walls of the ileum and throughout the colon there were myriads of little hard bodies about the size of No. 2 shot, some of them as large as a small pea. The intestine was not opened to determine the nature of these bodies, but there is little doubt that they were inflamed solitary follicles. Examination of the three other cases through the sigmoidoscope showed here and there little nodular swellings when the intestine was put upon the stretch. The summits of these elevations were sometimes abraded and bled upon touch (Plate I, Fig. 3). In the other cases the elevations had disappeared and in their places there were small, well-defined, shallow ulcers. The bases of these ulcers were smooth, flat, and granulating. The mucus secreted was not so abundant as that in hypertrophic catarrh nor so thick and tenacious as that in the atrophic variety. At the same time this condition may be complicated by either of these varieties of inflammation, and consequently one can not place much dependence upon the character of the discharges. When the disease is situated low down, one may feel with the finger small nodular elevations giving the impression of miliary tuberculosis, but this location of the disease is so rare that few physicians will ever have the opportunity of feeling it. The diagnosis practically depends upon the sigmoidoscope and ocular examination through it.

Treatment.—The treatment in this condition depends upon the cause and the location of the ulcers. Where there are evidences of intestinal obstruction, such as in the case related above, they should be removed. Where there is a catarrhal condition of the rectum and sigmoid, the treatment should be based upon the character of this disease. If the ulcerations are in the sigmoid and rectum within view through the sigmoidoscope, local applications of argonin, nitrate of silver, or antinosine may be made.

While there is some tendency to diarrhoea and frequent movements of the bowels, this can be controlled better by thoroughly flushing out

the intestine by a good dose of Epsom salts or castor-oil every second or third morning than by the use of opiates. The case in which the disease was located at the lower end of the rectum appears to be unique. The treatment adopted, viz., the excision of all the diseased mucous membrane and suturing together the healthy edges, proved perfectly satisfactory for the time being, but the period that has elapsed since the operation is too short to claim for it radical and permanent cure.

If the condition should be diagnosed as existing in the upper portion of the sigmoid and colon, it should be treated as advised for ulcerative colitis. In those cases in which this disorder is complicated by membranous colitis the treatment will be necessarily tedious and prolonged, and one may be finally compelled to make a right colostomy in order to afford the parts functional rest.

The disagreeable features of this method of treatment have been largely overcome by Gibson's "valvular colostomy" (*Medical Record*, 1901, vol. i, p. 405; *Boston Medical and Surgical Journal*, vol. i, 1902),

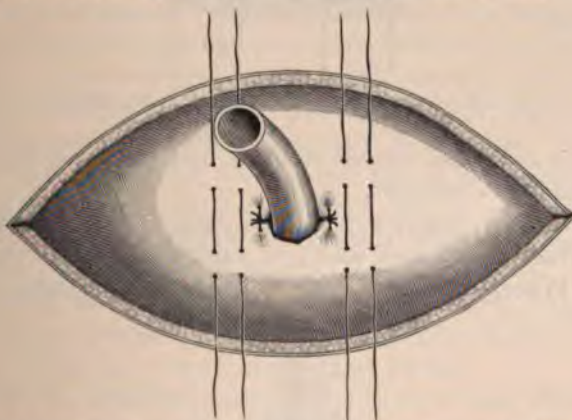


FIG. 88 A.—FIRST TIER OF SUTURES IN VALVULAR COLOSTOMY (Gibson).

which is applicable to all forms of chronic colitis, and is carried out as follows: The cæcum is exposed by an intermuscular incision an inch and a half long parallel to and just above Poupart's ligament. An opening is then made in the anterior longitudinal band of the gut sufficiently large to admit a good-sized soft-rubber catheter. Two or three tiers of sutures are then introduced in the serous surface of the gut (Figs. 88 A and 88 B), so as to infold the latter and form a sort of teat or valve protruding into the caliber of the intestine (Fig. 88 C). The ends of the last tier of sutures are left long, and carried through the edges of the abdominal wound, thus closing the latter, at the same time holding the gut in apposition with the abdominal wall. The catheter is left in for ten days or more, until the parts have healed. After this, it is taken

out and reintroduced as often as is necessary for the purposes of irrigation. The slight faecal fistula is controlled by a small pad, and the patient is not confined during the treatment.

By this means the entire colon is irrigated from above downward with medicated solutions, according to the judgment of the surgeon.

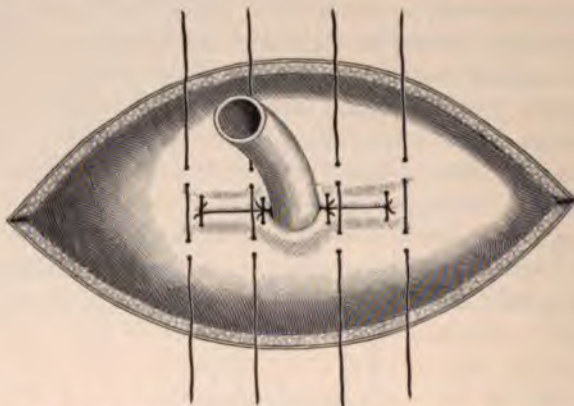


FIG. 88 B.—LAST TIER OF SUTURES IN GIBSON'S METHOD.

Bolton in his case used nitrate of silver 0.01 per cent, followed by a saline solution 0.05 per cent.

The operation is practically without danger, and, while it does not turn the faecal current aside and give functional rest to the colon, it enables one to keep the latter free from irritating substances by frequent



FIG. 88 C.—LONGITUDINAL SECTION SHOWING RESULTS OF INFOLDING BY GIBSON'S METHOD.

irrigation, and at the same time avoids the disagreeable features of an artificial anus. The small faecal fistula will close spontaneously after the use of the catheter is discontinued, or if it does not, it is an easy matter to dissect it out under cocaine anæsthesia and close it by sutures.

CHAPTER VI

TUBERCULOSIS OF THE ANUS, RECTUM, AND PELVIC COLON

TUBERCULOSIS is now recognized as the etiological factor in a number of conditions about the anus and rectum, the pathology of which was formerly unknown. The disease may develop primarily or secondarily in the skin, muco-cutaneous, mucous, and cellular tissues, and is always due to the tubercle bacillus.

In the skin and mucous membrane it assumes some interesting types, each of which was not long ago considered to have a special pathology, but which are now known to be due to this specific microbe. In the cellular tissues it develops abscesses and fistulas, and in the muscles fatty or destructive changes, which permanently disable them. It is propagated by direct invasion of the adjacent tissues or through the lymphatics. It advances in inverse proportion to the amount of fibrous tissue in its path; a pure cicatrix forms a barrier through which it can not pass. In the present chapter tubercular lesions of the skin, muco-cutaneous tissue, and mucous membrane will be considered, and the study of the involvement of the cellular and muscular tissues will be reserved for the chapters on Abscess and Fistula.

Owing to the different anatomical structures and varied relation of the parts, tuberculosis will be described as seen in the *perianal region*, the *anal canal*, the *rectum*, and the *pelvic colon*.

PERIANAL TUBERCULOSIS

In the skin about the anus, rich in hair follicles, sebaceous and sudoriparous glands, foci of tubercle bacilli often lodge and develop most destructive processes. They are divided into miliary, ulcerative, lupoid, and papillary or verrucous tuberculosis.

Miliary Variety.—This type of the disease is very rare; it is seen almost entirely in cases affected with tuberculosis of other organs, and is said by Chiari to occur almost exclusively at the muco-cutaneous margins; the author has seen it well outside of this area in the perianal skin.

It develops as minute nodules or infiltrations which feel like small shot or millet-seeds beneath the epidermis. They are always multiple, and grouped in crescentic or circular shape. They develop in the glands of the skin, and gradually grow larger until pressure upon the overlying epithelium causes necrosis, and it falls, leaving shallow, cup-shaped ulcers with ragged, indurated borders. Small miliary nodules may be seen covering the surface and edges of these ulcers. They discharge a scant amount of sero-pus and do not bleed on touch. They are more painful than most tubercular processes. As a rule, they remain stationary until the patient succumbs to the pulmonary affection, but they may spread, coalesce, and form extensive ulcers. Observations as to the histology of the surrounding tissues have not been made, but numerous tubercle bacilli were found in scrapings from the ulcers.

Treatment.—This local condition is so rare and of so little importance compared with the intestinal and pulmonary lesions which accompany it that no one has formulated any treatment for it. The application of the galvano-cautery or X ray might destroy the bacilli and cause healing, but the general constitutional condition is the chief factor in the case, and all effort should be bent to remedy this.

Change of climate, creosote, cod-liver oil, hypophosphites, forced feeding, and all the hygienic measures adopted in general tuberculosis should be employed; but after all, nothing that is known at present can enable one to give a favorable prognosis in such cases.

Ulcerative Variety.—All tubercular processes of the superficial teguments arrive sooner or later at an ulcerative stage. The characters of these ulcers differ according to the tissues involved and the constitutional condition of the patient.

Simple tubercular ulcers of the anus begin in an obscure manner. They may develop from contusions, wounds, and injuries, or they may be idiopathic.

The patient generally has a history of tuberculosis either hereditary or acquired, but there may be no marked localization of the disease. A small induration or nodule occurs in the superficial layers of the skin. Traumatism, friction, or injury may cause a breaking down of the tissues, and ulceration results. This may be brought about by an attack of diarrhœa, a horseback or bicycle ride, or a thrombotic hæmorrhoid. It may start in the anal canal or in the skin itself around the anus; it may be confined to the latter tegument, or it may be limited to the anal canal.

As to the comparative frequency with which it attacks the two portions of the anus, it is difficult to decide. In nearly all of those cases which the author has observed, the ulceration has at one time or another involved both the perianal tissues and the anal canal. Hartmann, in his

exhaustive studies upon this subject, states that he has four times seen these ulcerations almost entirely surround the anus, destroying all the cutaneous tissues with the exception of a small bridge of skin which was left intact without involving the anal canal. They may develop singly and spread to both sides of the anus, or several ulcers may develop at one time and coalesce to form one large, irregular ulcer (Fig. 89). They are irregularly round, the edges more or less ragged, and they tend to spread circularly and upward into the anal canal at the same time.

The borders are clear-cut, undermined, with a pale sloughing edge, which fades off into a rose-colored border in the skin. There is an induration or hypertrophy around the margin; the base of the ulcer is irregular, grayish in color, and presents a sort of elevation in the center, with a depression around the edges beneath the undermined skin (Plate II, Fig. 3).

The granulations are pale, do not bleed easily, and are of very unequal sizes. Here and there scattered over the ulcers are small yellowish pimples or tubercles which seem to be embedded in

the tissue. These may be picked out with a needle or a sharp spoon, but they do not come away with gentle wiping or irrigation. When they are picked out they will leave a sort of cavity, smooth and shining, and about the size of No. 8 bird-shot. Hartmann stated that the surface of these ulcers was always soft and supple except in two cases. The author has excised a number of them, and has yet to find one in which there was not an induration beneath the area involved; he has found in the scrapings tubercle bacilli, thus proving their nature; and beneath the granulating tissues of the ulcers there was a smooth, glistening tissue that showed a fibrous alteration of the teguments beneath, or, in fact, a real cicatricial development, in which no tubercle could be found.



FIG. 89.—PERIANAL TUBERCULAR ULCER SURROUNDING EXTERNAL OPENING OF A FISTULA.

Pain is not a marked symptom. Ordinarily the patient suffers very little even from faecal passages or the direct handling of the parts. Occasionally, however, when the ulceration invades the anal canal and assumes the form of fissure, the pains become more severe at the time of defecation. As a rule, however, tubercular ulcerations of the anal canal and its margin are both comparatively free from pain. Almost without exception has this been the case in the large number of tubercular ulcerations of the anus seen in consumptive patients in the hospital on Blackwell's Island. In two cases in which the ulcers were excised, previous to the operation and immediately thereafter the patients suffered no pain whatever; but when the wound had almost healed, and there remained only a small granulation at the margin of the anus, they began to complain of sphincteric spasm and pain following the faecal movements.

In another case, in which a tubercular ulceration was cauterized with the Paquelin cautery, there was no pain previous to it, nor after the first cauterization; but after the second, when the discharge had almost ceased and the ulceration was apparently healing, the patient suffered more or less acute pain after faecal movements. At this time, examination of the slight discharge, and also the scrapings of the ulcers, failed to demonstrate the presence of any tubercle bacilli. The tubercular process was afterward reestablished in this wound, and it became again painless to the touch. It is difficult to understand why these ulcerations are not painful. There is the inflammatory element, the development of fibrous tissue, the involvement of the sensitive nerve areas—in fact, every element necessary to account for the production of pain, but no satisfactory explanation of its absence has been offered.

The discharge from these ulcers is generally limited, of a thin purulent character, and very rarely tinged with blood. Sometimes there may be a mixed infection, and the quantity of the discharge is materially increased.

When this type of ulcer extends into the anal canal it does not usually assume the form of fissure, as do most other ulcers, but seems to spread over the radial folds and down into the sulci at the same time. It is usually limited by the "white line" of Hilton, but may extend upward to the border of the sphincter, and end in a clear-cut margin, somewhat indurated, with a perfectly healthy mucous membrane just above it.

The progress of tubercular ulceration around the anus is variable. Sometimes it is very slow, while at others it is rapid and destructive in the highest degree. Contrary to the history of syphilitic ulcers, there is no tendency to heal in one part while they progress in another. A tubercular ulcer in the absence of treatment shows but one

tendency, and that is to progress in all directions; under general constitutional and local treatment it may be healed, but if left alone its onward march is stopped only by death; it is not, as a rule, fatal in itself, but it remains as a disturbing element until the end comes through development of other tubercular lesions or some form of intercurrent disease; ordinarily it is acute pulmonary or genito-urinary tuberculosis.

ANAL TUBERCULOSIS

Tuberculosis may attack the anal canal either by extension from the perianal region or primarily. Indeed, it is often a question whether the disease originates in the perianal or intra-anal tissues. In the anal canal the miliary or nodular type is rarely observed, but the ulcerative form is very common. It assumes the shape of fissure simply on account of the conformation of the parts, the overlying membranes being corrugated or compressed into folds by the contraction of the sphincter. It does not long remain confined to the sulci, but rapidly extends toward the cutaneous margin and upward upon the radial folds, sometimes crossing over from one sulcus to another, entirely destroying the muco-cutaneous covering.

The ulcers may be single or multiple. In the latter case they soon coalesce to form one ulcer which may entirely surround the canal. They are distinguished by their clear-cut though irregular borders, their grayish-yellow bases, with here and there round tubercles in the granular mass, and by the little foci of disease that extend into the subcutaneous tissues like worm-holes in wood, and sometimes result in subtegumentary fistulas (Plate II, Fig. 1).

The absence of pain in any marked degree is the most characteristic feature of the intra-anal tubercular ulceration. All other forms may, under certain circumstances, produce acute, lasting pain, resembling true irritable ulcer, but with the tubercular ulceration this almost never occurs. It is true that tuberculosis may be ingrafted upon an irritable ulcer, and we may have the two conditions combined in the same anus, but under such circumstances one will have the history of lively pains and spasm of the sphincter having existed for a period entirely too long for the tubercular ulceration to have remained so limited in extent. Had the lesion been tubercular at the beginning there would have been greater destruction of tissue than is seen in such mixed cases. Chancres, mucous patches, and rodent ulcers of the anus are all much more painful than the tubercular variety. The explanation of this fact may lie in the relaxation of the muscles, or it may be due to the fact that beneath and around the tubercular ulceration there is always formed a connective-tissue envelope or wall which is not thick, but which pro-

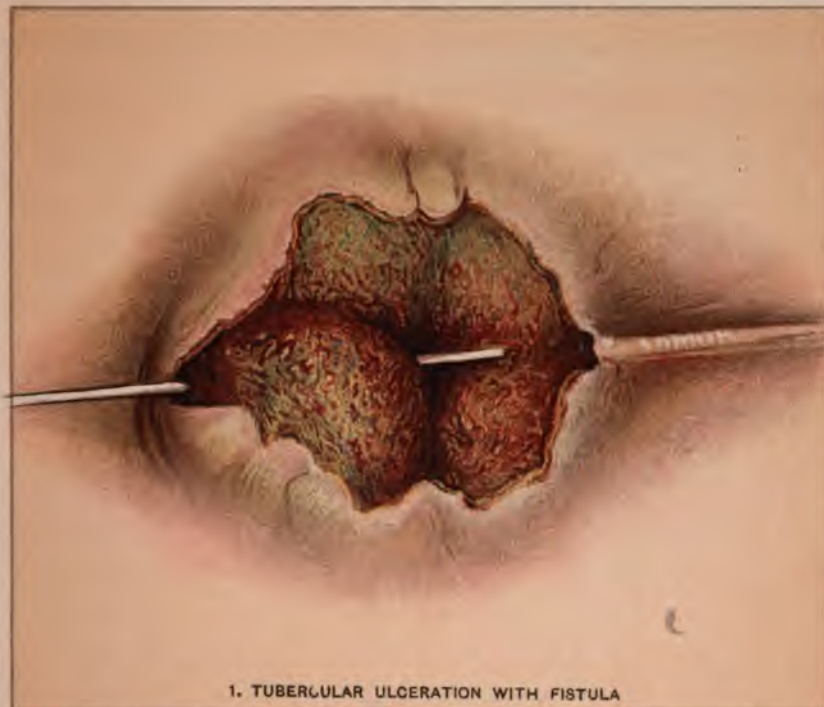
fects the deeper tissues from infection by the pathogenic process and thus avoids the involvement of the sensitive nerve roots in a process of perineuritis associated with muscular contraction. Involvement of the lungs and other organs is much more frequent in tuberculosis of the anal canal than in that of the perianal region. The higher the involvement of the intestinal canal, the greater is the probability of general tuberculosis.

Pathological Anatomy.—The pathological examination of these ulcers shows always upon the cutaneous border degeneration of the corneous layer of the epithelium. There is hypertrophy of the papillary layer and great infiltration of the chorion, which dips well down into the deeper layers of the derma. The granular stratum is depressed by the inflammatory processes. The Malpighian bodies are sometimes hypertrophied or swollen, sometimes absent. The blood-vessels present evidences of tuberculosis in the thickened and fibrous condition of their walls. The papillæ, hypertrophied and infiltrated, compose the fleshy granulations, and by their conglomeration produce the caseous follicles. These fleshy granulations appear rough and elevated in spots, but do not have deep sulci dipping down between them, as in condylomata. As Hartmann says: "In these masses there exists a number of caseous tracts which start out, in general, perpendicularly to the surface of the ulceration. These tracts, which open probably by small mouths upon the surface, are lined with epithelial cells, and result from the fusion of a large number of tuberculous follicles, as is proved by a certain number of isolated follicles." My examinations have not demonstrated these facts, but we must accept the reports of such careful work as has been done by the authors quoted (*Chir. d. rect.*, vol. i, p. 124).

The most important element in these pathological examinations, however, is the cicatricial or fibrous layer which develops in the deepest tissues down below these tracts and outside of the area in which the tubercles are found. This material not only involves the smooth and striated muscular fibers, but also the blood-vessels and the nerves; the latter are included in sheaths of embryonic cells and a sclerotic tissue similar to that developed in the muscle. In this portion of the ulceration we have to deal with a purely inflammatory process which forms a sort of wall around the tubercular focus, thus obstructing the invasion of the surrounding healthy tissues by the tubercle bacilli.

The rationale of this is shown in the fact that where a cicatrix exists, the disease does not progress beyond it. Cicatricial tissue is an absolute barrier to the extension of tubercular processes. A tubercular ulcer may involve the whole circumference of the anus and never dip deeper down than the derma, because this wall of connective tissue is formed at its base. Quénu relates a case in which the ulceration developed near the

PLATE II.



1. TUBERCULAR ULCERATION WITH FISTULA



2. LUPOID ULCER



3. SUPERFICIAL TUBERCULAR ULCERATION

ANAL TUBERCULOSIS

site of an old fistulous tract, and states as a very interesting experience that the ulceration never crossed or broke down the cicatrix left by the old operation. His experience is by no means unique. It is easily explained by the facts that cicatricial tissue is almost devoid of blood-vessels, and is absolutely free from lymphatics, and the progress of the tubercle is always along one of these lines. This is the most important discovery with regard to tubercular ulcers in recent years, second only to that of the bacillus, and it forms the basis of all local treatment.

Fatty degeneration of these ulcers is a very rare occurrence. Involvement of the lymphatic glands occurs, if at all, early in the process. Pulmonary or genito-urinary tuberculosis may develop from the disease in the anus, but usually they precede the latter.

Treatment.—In the large majority of cases the local lesion is a minor consideration compared to the probable constitutional involvement. The healing of the sore depends upon the power of resistance in the tissues, and the better the physical condition of the patient the greater will be this power. All treatment, therefore, which depresses the vital forces, which decreases the tone of the tissues in general, or which interferes with the free and full oxidation of the blood will be detrimental in the management of these cases. Thus, extensive operations which confine the patient to bed or even to the house are unadvisable. Prolonged local treatment, which requires the patient to remain in large centers of population, or to be confined in hospital wards, is not likely to prove successful. Change of climate, outdoor exercise, forced feeding with fats and hydrocarbons, together with massage and oil inunctions, will do more for these conditions than local treatment or surgical operations; at the same time the latter need not be neglected.

The parts should be kept clean by bathing with peroxide of hydrogen, solutions of bichloride of mercury, or other antiseptics. If the ulceration is extensive, a gauze dressing moistened with one of these solutions should be kept applied. Painting the ulcer with a solution of methylene blue, 10 grains to the ounce, seems to have a good effect, and can be carried out by the patient himself. As a rule, powders seem to make these ulcers worse, but recently some very good results have followed the application of orthoform. In one case a large tubercular ulcer, involving almost the entire anus and dipping well into the ischio-rectal fossa and the perineal triangles, has almost completely healed under the combined use of this drug and the methylene-blue applications. The same ulcer grew steadily worse during treatment by the actual cautery and many other methods ordinarily advised.

Recently the Roentgen rays have been recommended for these cases, but nothing definite is known as to the results of this treatment. The occasional application of the actual cautery, together with the local

and hygienic measures indicated above, appear to be the most reliable methods. The cases treated by orthoform and methylene blue, up to the present writing, are too few to justify one in recommending the method unreservedly; it appears, however, to be worthy of further trial.

Lupoid Ulceration of the Anus.—For a long time it was believed that lupus was a specific variety of ulcer. Recent studies in pathology, however, have shown it to be only one of the many manifestations of tuberculosis. It is of a particularly aggravated form, slow in its march, yet fearfully destructive of tissues.

Under the title *Esthiomene* and *Lupus Exedens* this condition has been described with great detail by R. W. Taylor (New York Medical Journal, January 4, 1890). His conclusions at that time were that the condition is a syphilitic manifestation. This view, however, has been abandoned, and we now come to recognize in lupus only another form of tuberculosis. Those who formerly held that the condition was syphilitic advance the theory that the peculiar course of the ulceration was due to inoculation of tubercular or scrofulous individuals with syphilis. Were the ulceration of a syphilitic nature, as has been held by these writers, constitutional treatment would have modified its course, checked its advances, and prevented its recurrence, but such is not the case. Upon these ulcerations syphilitic medication has no effect whatever.

The condition is characterized by progressive ulcerative destruction. Ordinarily it begins at the muco-cutaneous margin either of the anus or the vulva. The outline of the ulcer is irregular, clear-cut, and indurated. One sees at times a slight tendency to cicatrize at certain points, but after a short time these cicatrizations break down, reulcerate, and spread farther in the tissues. Taylor does not state what was the final result in the cases which he saw, but of the 5 cases reported by Allingham, 3 certainly, and probably 5, finally succumbed to tuberculosis. Beneath the ulcers there is always the development of fibrous infiltration identical with that which we have described beneath the simple tubercular ulceration, and through which the destruction of tissue does not break until very late in the disease. Upon this point Kelsey says, in recounting an interesting case upon which he operated and tried to remove the ulcerated condition by scraping and cauterization: "I was surprised to find it impossible to reach healthy tissue below the ulcer without removal of an immense mass of inflammatory thickening. There seemed to be no healthy connective tissue near the sores, but simply a brawny, honeycombed condition, resembling, after scraping, a mass of hard cheese, with a network of connective-tissue fibers running through it."

The spaces between these fibers were undoubtedly due to fatty de-

generation of the muscular fibers and tubercular invasion of the lymphatics and cellular tissue. In this same case specific treatment was carried to its full extent, but without effect, and the patient finally died from exhaustion. The extent to which this form of ulceration may proceed is exemplified in the following case reported by Angus McDonald (Edinburgh Medical Journal, 1884, p. 910):

Quoting Duncan's description of the case, he says:

"A case to which I was called some years ago is, so far as I know, so unprecedented in the amount of destruction as to be worth describing. I only saw it once in consultation. The disease was at one time regarded as cancerous. The patient, aged about forty, had had the disease for at least five years, and she lived many years after my visit. While the disease was already extensive she bore a child. On the hips, just beyond the ischial tuberosities, were long scars, thin and bluish, of healed ulcers. The entire ano-perineal region was gone, there being a hollow space as big as a foetal head. The urethra was entire, as well as the mucous membrane between it and the cervix uteri, which was healthy. Except the anterior portion of the vagina, no trace of it, or of the anus or rectum, was discoverable; behind the cervix uteri the bowel opened by a tight aperture, just sufficient to admit a finger; when the faeces were hard she could keep herself clean, but only then. Although the extent of ulceration was severe the patient was attending to her household duties.' To this graphic description of the case I can fully subscribe, with this addition, that latterly the ulceration went still higher up into the pelvis, leaving the bowel hanging loose for some distance from the upper level of ulceration, giving it the appearance of the torn sleeve of a coat. This patient lived two and a half years after the time referred to by Dr. Duncan, and died of exhaustion and diarrhoea. Notwithstanding this shocking amount and prolonged continuance of ulcerative action, there was no involvement of inguinal or other glands."

Allingham, Ball, and others have seen cases similar to this, but less extensive. Bender (*Vierteljahr. f. Derm. u. Syph.*, Wien, 1888, p. 891) describes one in which a large portion of the rectum was involved. Ordinarily, however, the ulceration is limited to the cutaneous and mucocutaneous tissues.

Generally the ulcer begins in one or more little circular or semi-circular infiltrations in the skin or muco-cutaneous tissue about the anus. These break down, ulcerate, and, spreading at their borders, the little foci coalesce and form larger ulcers. The edges are sharp-cut and not so much undermined as in simple tubercular ulcerations. In one respect it seems to differ entirely from these, in that it has a tendency to heal temporarily and produce cicatrization in certain areas;

but this only lasts for brief periods, when it breaks down again, and the destruction of tissue advances beyond the original limitations. Sometimes the ulcerations may take on a serpiginous form, advancing in two or more narrow tracts. After a time the intervening tissue between these tracts gradually breaks down, and the whole area becomes a part of the original ulceration. The edges of these ulcers are never thickened or indurated to any great extent. The granulations are generally pale, although occasionally they may be bright red and exuberant. Bender describes them as a reddish-brown, and sometimes of an efflorescent type. The base of the ulcer itself is soft, but the underlying inflammatory deposit gives to it a stiff, inelastic feel upon firm pressure.

The pathological examinations of these cases made by Besnier and Schuchardt place the tuberculous nature of the ulcers beyond doubt.

In one case seen in the city almshouse, a man, aged seventy-four, had suffered from ulceration about his rectum for a number of years. It never gave him any particular pain, and only required the wearing of a cloth to protect his clothing. When seen by the writer it had become somewhat difficult to move his bowels or to walk. Examination showed a vast ulcerated area involving the entire circumference of the anus, and extending as high up as the upper border of the external sphincter. The skin for 2 inches around the entire anus was destroyed, and the ulceration dipped down into the cellular tissues posteriorly and at the sides of the rectum to a depth of $\frac{1}{2}$ an inch or more. The margins of the ulceration were not indurated but slightly undermined. There were at points in its circumference evidences of attempts at cicatrization, but there was no contraction or apparent diminution in the size of the ulcers from these efforts at healing. The granulations were not exuberant or efflorescent at any point, but were more of a grayish-brown, proud-flesh nature. Beneath these granulations there was a hard resisting base which extended outside the margin of the ulceration and upward until it joined the wall of the gut. At the upper margin of the ulceration the mucous membrane of the rectum, clear-cut, infiltrated, and somewhat elevated, seemed absolutely to limit the invasion of the disease, and was perfectly healthy at a distance of one or two lines above.

The patient had pulmonary tuberculosis at the time, and was taken from the hospital shortly afterward to a home in the country, where, it was since learned, he died from the disease.

The area of ulceration from side to side measured $5\frac{1}{2}$ inches, from before backward $2\frac{1}{4}$ inches, and the depth from the margin of the anus upward behind the rectum was about $\frac{1}{2}$ an inch.

There appears to be quite a difference of opinion between Alling-

ham and other observers concerning the clinical appearance of lupoid ulceration, its location, and the nature of its invasion. The former holds that it occurs in the rectum, and its tendency is to attack the mucous membrane rather than the skin; that it does not invade the neighboring tissues by infiltration or through the lymphatics, forms no secondary deposits, produces no hardness, and does not affect the follicles. He states that the diagnosis can be positively made on sight.

Others (Ball, Cripps, Kelsey, Gant, Taylor, and Quénu) state that it is generally found in connection with the disease in the female genitals, and is largely confined to the skin and muco-cutaneous membrane; that there is induration about the base and edges; that microscopic examination establishing the presence of tubercle bacilli or giant cells is necessary to distinguish it from epithelioma and syphilitic ulceration, and that it does extend along the lymphatics.

All agree that it is essentially a destructive lesion and of a tubercular nature, with clean-cut, irregular, rarely symmetrical edges that may or may not be undermined.

The writer has observed two cases almost from their incipiency. Both were in males, and began in the skin at the anal margin. One developed around the cicatrix of an old fistula, as in the cases of Schuchardt and Besnier, and the other in a skin-tab just below a fissure. Both started as little nodules or indurated masses in the skin. These seemed to have no relation to the hair follicles, but in one case appeared like obstructed sebaceous glands. The nodules in each case broke down, discharged a sort of cheesy pus, and left round, clear-cut ulcers. These soon coalesced and formed one large ulcer, which slowly but steadily extended around the anus and into the anal canal. In one case the process involved the mucous membrane to the height of $\frac{1}{2}$ an inch, in the other it stopped abruptly at the ano-rectal line. In the fistula case the cicatrix seemed to limit its extent in one direction, so that only half of the circumference of the anus was involved. In the other the disease spread all round the aperture (Plate II, Fig. 2). In both cases there soon developed a fibrous or cicatricial deposit beneath the ulceration, which extended almost to the healthy skin outside of it. This mass was penetrated here and there by small, soft spots due to fatty degeneration of the muscular fibers.

The ulcerations were irregular in shape, with well-defined, indurated borders slightly undermined. The bases were brownish-gray, depressed, and covered with scant, purulent secretion. There was practically no pain in either case.

Histological examination of the scrapings showed tubercle bacilli present in both cases. The extension seemed uniform and not in the lines of any vessels or lymphatics. Time and again in both cases the

parts appeared to be healing and then broke down again, leaving the ulcer deeper and more extensive than before. In neither case were bright-red or efflorescent granulations, as described by Bender, seen except in very small spots. The ulcers did not bleed easily on touch.

Treatment.—The usual treatment of this condition consists in the application of chemical or actual cauterization. Nitric acid, chloride of zinc, acid nitrate of mercury, etc., have been advised, as have also the Paquelin and galvano-cautery. Where there is pain this will be somewhat relieved for a time by such applications, but the benefit is only temporary. According to Piffard, the application of strong solutions of peroxide of hydrogen used every few days seems to be more effectual in the destruction of the tubercle bacilli and the development of healthy granulations than any of the other chemical agents. It may be well in the beginning of the treatment to cauterize the parts thoroughly by the Paquelin cautery, but one must always remember that the constitutional condition of the patient suffering from this form of disease is not such as to justify any great shock or destruction of tissue, and that the lack of vitality in the parts may cause such a burn to result in extensive slough, and thus do more harm than good. While actual cauterization is superior to chemical, or excision, or curetting in these conditions, the author can not but sound a note of warning in view of the experience which he saw some three years ago in the New York workhouse.

A young man having an extensive lupoid ulceration about the margin of the anus, which the attending surgeon looked upon as chancroidal, was etherized and the ulceration excised, the base being thoroughly burned with a Paquelin cautery. The patient suffered extremely from shock. There was great sloughing of the tissues, so much indeed that the whole external sphincter and lower inch of the rectum for one-half of its circumference were destroyed. The patient suffered from incontinence, and within a few weeks developed acute tuberculosis, from which he died in about five months. The examination of the specimen showed typical characteristics of tubercular ulceration. Conservatism, therefore, is of the greatest importance in the treatment of these ulcers.

Methylene blue, 2 per cent in water, has held the disease in check better than any other remedy in my hands, but nothing has cured it. Electrolysis and the X ray have been recommended, and recent reports seem to confirm its usefulness; tuberculin has been tried, but in vain.

Curettage, followed by the X ray, together with general constitutional treatment by tonics, cod-liver oil, creosote, and forced feeding, appears to give the most uniform results.

Verrucous Ulcerations of the Anus.—A very rare variety of ulceration of the anus has been described under the above name. The first

cases reported were by Toupet and Routier (Congrès pour l'étude de la tuberculose, 1893, p. 509) in 1893. At the same congress M. Hartmann reported two cases of this condition (*ibid.*, p. 59). It resembles epitheliomatous or papillomatous ulcerations of the margin of the anus. Judging from the descriptions given by these authors, it would appear to be of the nature of tuberculosis varicosis acutis or lupus papillaris varicosis, as described in the works upon dermatology. In a case communicated by M. Duplaix the appearances of the ulcers are described as follows:

"Scattered around the anus in places there are small vegetations slightly jutting out above the healthy skin which surrounds them. In places the skin, slightly ulcerated, shows small columns separated one from another, agglomerated and adherent at their bases, but free at their other end. There is a mixture of small mammillations and of the villous points. The lesion extends into the anal canal and prolongs itself 4 or 5 centimeters into the rectum, where one with the finger is able to feel numerous anfractuosités separated by the healthy mucous membrane. The whole rests upon an indurated base, and gives an abundant purulent secretion, sometimes mixed with a little blood." (Quénu and Hartmann, p. 105.) Hartmann states that in one case which he observed, the ulceration was in the neighborhood of a cold abscess of the margin of the anus, and had the appearance of a papilloma. The chief characteristic of these ulcers is their papillary or mammillated appearance. They may be confined to the cutaneous tissue, or they may penetrate the anal canal and rectum, as in the cases of Hartmann and Duplaix. The villous formation sometimes becomes crusted over, thus forming a dry scab, which in a short time comes away, leaving a raw, papillomatous surface, the papillæ being separated by small bloody fissures. The base of the ulcer is indurated, but this induration does not extend into the surrounding tissues. The lymphatic glands are enlarged.

The tubercular nature of the ulcers has been verified by inoculation of rabbits and histological examination. In all the cases in which segments of the ulceration were examined, there were found in the superficial part of the skin and in the papillary prolongations of the chorion tracts of embryonic cells containing giant-cells and tubercle bacilli. In one case Hartmann found veritable tuberculous follicles with the three typical zones composed of giant, epithelioid, and embryonic cells. In one case there was a fistulous tract which extended 6 centimeters underneath the skin and mucous membrane.

The patients did not complain of much pain except in two instances. In cases in which the ulceration invaded the rectum there was a diarrhœa accompanied by slight pain at the time of defecation. In one instance there was fæcal incontinence. The ulceration appears in-

sidiously; the patient notices only a slight roughness at first, then a swelling and tenderness of the parts, and finally a discharge of either pus or blood. In all the cases so far reported there have been evidences of pulmonary tuberculosis.

Treatment.—The nature of the ulceration being undoubtedly tuberculous, the treatment should be based upon the same principles as those laid down for the treatment of simple tuberculous ulceration of the anus and rectum.

TUBERCULOSIS OF THE RECTUM AND SIGMOID

Primary tuberculosis of the lower portion of the intestinal tract is exceedingly rare. There are a few instances in which the disease has been found in the recta of children, but in adults it is almost unknown. As secondary to the disease in other organs, however, it is comparatively frequent.

An examination of 75 cases of tuberculosis in all stages at the Alms-house Hospital showed ulceration of the rectum and sigmoid in 22—i. e., 29.3 per cent. This large percentage is due to the fact that many of the cases were selected for examination on account of having had some intestinal disturbances. The statistics of Louis, Leibert and Bayle, Willigk and Eisenhart state that lesions of the intestine occurred in 49 to 80 per cent of their tubercular patients. The ileum and cæcum are the most frequent sites owing to the preponderance of solitary follicles at these points. Fenwick in 500 autopsies found tubercular ulceration of the rectum and sigmoid in 14.1 per cent and 13.5 per cent respectively. No case is reported, however, in which these were present without involvement of the lungs and other organs. We have seen two instances which appeared to be primary tuberculosis of the rectum. They were both small, round, or elliptical ulcers with ragged, undermined edges, gray, conical bases, and not indurated. A few tubercle bacilli were found in the scrapings, but no giant-cells. In one case the patient subsequently developed pulmonary tuberculosis, the other apparently recovered. It is possible, of course, that the bacilli may have come down through the intestinal canal, lodged in the ulcer, and may not have been its cause. The facts and symptoms, however, do not warrant any such conclusion.

Infection of the intestinal walls occurs through the invasion of the lymphoid or solitary follicles by tubercle bacilli. These may enter the canal through the ingestion of food, and there is no reason why they may not pass down and infect the sigmoid and rectum. Abrasion or injury is not necessary for the invasion by the bacillus, but no doubt contributes to it.

Secondary tuberculosis of the rectum occasionally occurs as miliary deposits beneath the mucous membrane, and frequently as ulcerations. The miliary type is generally secondary to tuberculosis of the genito-urinary organs, especially of the prostate. In two of the cases observed, the condition developed after the removal of prostates which were proved beyond all doubt to be tuberculous, and in all cases there were symptoms indicating tuberculosis of the genital tract. It is always, so



FIG. 90.—TUBERCULAR ULCERATION OF THE RECTUM WITH SUBMUCOUS FISTULA.

far as our experience shows, located in the anterior rectal wall. It consists in little miliary deposits which feel like bird-shot beneath the mucous membrane. These may remain stationary for a long time, or they may break down and form small cup-like ulcers. The latter sometimes coalesce and form larger ulcerations, or they may burrow and connect with each other underneath the mucous membrane, thus forming small submucous fistulas (Fig. 90).

In one case it was possible to scrape out one of these little miliary deposits. It was a round, cheesy mass, quite firm; and under the microscope it showed numerous round cells undergoing cheesy degeneration, with here and there a tubercle bacillus. No giant-cells were found in this specimen, but their absence is not unusual in such tubercles. The little ulcer from which this tubercle was removed healed perfectly after cauterization with carbolic acid. This condition has not been seen by the writer above the rectum, and it is not reported in any of the statistics to which reference has been made.



FIG. 91.—TRANSVERSE SECTION OF TUBERCULAR ULCER OF THE RECTUM, SHOWING ELEVATED CENTER AND UNDERMINED EDGES.

in these portions without its involving the ileum, cæcum, and other portions of the colon, but in 2 cases in which the patients died from pulmonary hæmorrhage the ulcerations did not extend above the sigmoid.

Histological examinations show that the disease begins in the soli-

Tubercular ulceration of the rectum and pelvic colon secondary to tuberculosis of the respiratory organs is not uncommon. It is rare to find it

tary follicles. The lining cells of these increase, their nuclei multiply, giant-cells are developed, the whole undergoes a caseous degeneration, the overlying epithelium becomes necrosed, and an ulcer is formed. A

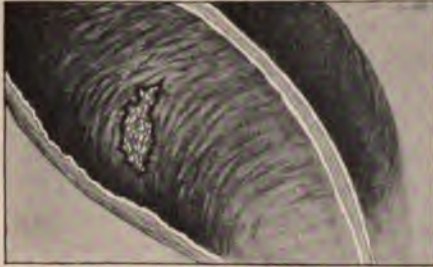


FIG. 92.—TUBERCULAR ULCER OF THE RECTUM.



FIG. 93.—TUBERCULAR ULCERATION OF THE RECTUM.

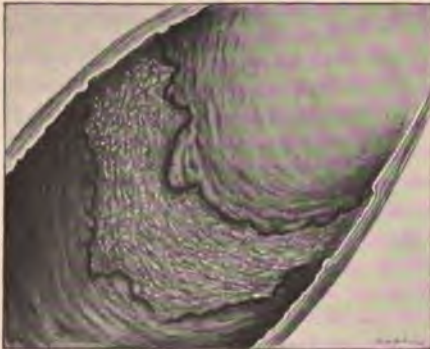


FIG. 94.—TUBERCULAR ULCER ENCIRCLING THE SIGMOID.

transverse section of one of these ulcers (Fig. 91) shows a central elevation, which gradually declines to the periphery beneath the mucous membrane, thus causing an undermining of the latter. In the elevated portion of the base small yellow tubercles may sometimes be seen with a low-power magnifying-glass, or even with the eye.

The ulcers are originally round or elliptical in shape, but they spread by degeneration of the borders, or coalesce with one another until they form large, irregular patches (Figs. 92, 93). The ulcers follow chiefly the course of the blood-vessels; hence, in the lower portion of the rectum they spread in all directions, in the upper portion horizontally, and in the sigmoid their tendency is to encircle the canal (Fig. 94). In this and in the colon, where the ulceration has extended around the gut and thus followed the blood-vessels and lymphatics to their end, the process may be arrested, the parts cicatrize, and a true stricture be formed. This pathology may be criticized, but the section of a stricture

having tubercular characteristics under the microscope, and with tubercular ulcers above and below it, is presented in Fig. 95.

Beneath all tubercular ulcers there is a deposit of fibrous material, whether they occur in the intestinal canal or outside of it, which has

been described as an effort on the part of Nature to defend tissues against the bacilli (Fig. 96). She builds, as it were, a wall around the infection, and so long as it remains intact the disease will be limited to that spot. Green and Martin have called attention to this, saying it explains why perforations so seldom take place in tubercular ulceration of the intestinal tract.

Symptoms.—The symptoms of tuberculosis of the rectum and pelvic colon will depend upon the site and extent of the disease. Where it is localized they will be those of chronic inflammation of the organs—viz., pain in the back, diarrhœa, or frequent desire to defecate without relief, discharges of pus, blood, and mucus, and disturbances of digestion.

The discharges are never so abundant as in syphilitic ulceration, but the odor is more gangrenous. The blood is never abundant; sometimes it is fresh, and at others tar-like, indicating that it has been retained for a while, and ordinarily it is mixed with the fæces.

Ashby says that fatal hæmorrhages may occur from these ulcers, but the statement is not corroborated by other observers.

There is no acute pain at the site of the ulceration, and only very rarely is there any lessening of the caliber of the gut to cause obstruction to the fæcal passages in the rectum, but this may occur in the sigmoid.

To the finger the ulcers give the impression of a soft, granulating mass on a firm base, and surrounded by irregular, slightly thickened edges. Through the speculum they appear as irregular ulcerations with slightly elevated, gray, sloping bases, surrounded by slightly thickened and undermined edges (Fig. 97).

In the last stages of general tuberculosis, where the whole intestinal tract from the cæcum down is involved, the patient will suffer from tenesmus, diarrhœa, tympanites, digestive disturbances, and great emaciation. The



FIG. 95.—TUBERCULAR STRICTURE AND ULCERATION OF THE SIGMOID.

frequency of the stools is distressing, and the discharges of pus and black, tar-like blood are more abundant.

Examination with the finger in such cases does not reveal much, as the whole rectum is bathed in a slimy muco-pus which obscures every-



FIG. 96.—PHOTOMICROGRAPH OF TUBERCULAR ULCER OF THE RECTUM.

thing. After the secretion is wiped away, one may see through the speculum large areas denuded of mucous membrane with little islets of healthy tissue here and there. At other times there appear linear ulcerations branching like the limbs of a tree from a central point, and forming little ulcerated crevices, apparently following the lines of the arterial supply. The mucous membrane between these tracts is swollen, red, and undermined. It soon breaks down, and the whole is converted into one large ulcer, such as has just been described. This extreme condition is only seen in late stages when dissolution is imminent.

Diagnosis.—Diagnosis of initial tuberculosis of the rectum is very difficult. The nature of the ulcer, as described above, its tendency to follow the course of the lymphatics and blood-vessels, the dead, grayish elevated base and undermined edges, are all indicative of the nature of the disease. The discovery of tubercle bacilli in the discharges or



FIG. 97.—TUBERCULAR ULCER WITH SPUD INTRODUCED BENEATH THE UNDERMINED EDGE.

scrapings from the ulcer would, of course, settle its pathology to a certain degree, but one must always bear in mind that tubercle bacilli may be passed through the intestinal tract, and that they might be found in the pus of an ulcer, which ulcer itself was not tubercular. A more positive and certain diagnosis could be determined by excising the base and examining this for giant-cells and tubercle bacilli. The culture test is our final resort, but this

is generally impractical. The clinical features of the case, however, are fairly reliable. In those cases associated with general or pulmonary tuberculosis the history of the case, the general physiognomy of the patient, the character of the ulcers running parallel with the blood and

lymphatic supply of the rectum, the great loss of fat, and the sunken-in condition of the anal margin, together with the appearances of tubercle bacilli in the discharges from the rectum, will serve to confirm a diagnosis which is always inferred when symptoms of diarrhœa, indigestion, and intestinal disturbances occur in the tuberculous.

Treatment.—The treatment of tuberculosis of the rectum and pelvic colon is not encouraging. In a few localized conditions in the rectum the ulcers may be scraped out, cauterized, and healed under the best hygienic conditions, but these cases are very rare. In the large majority general tuberculosis of the respiratory or genito-urinary system will have been established before any notice is taken of the intestinal complication. All that can be done in such cases is to keep the parts clean by colon flushing with antiseptic solutions, and protect them from irritation as far as possible by a bland but nourishing diet.

The hygienic and therapeutic measures suggested in the section on anal tuberculosis are applicable here, but the prognosis is not so favorable. It is simply a question of general tuberculosis, the cure for which has not yet been found.

Hyperplastic Tuberculosis.—Under this title, suggested by Coquet (Thèse, Paris, 1894), has been described a peculiar condition of tubercular infiltration of the intestinal walls. It occurred most frequently in the ileo-cæcal region, but was found in other portions of the large intestine, particularly the rectum. Delbet and Mouchet (Archiv. gén. de méd., 1893, pp. 513, 668) referred to it under the title of rectitis hypertrophique, proliférante et sténosante. It is characterized by extensive formation of fibrous and tuberculous granulation tissue in the wall of the gut. It induces a sort of fibrous hyperplasia instead of caseation and necrosis. In the large intestine it resembles scirrhou cancer very much, and even Billroth once removed a section of the gut affected by this disease under the impression that it was carcinoma (Wien. med. Presse, 1891, p. 193).

Lartigau (The Journal of Experimental Medicine, vol. vi, p. 41) says: "For years hyperplastic tuberculosis of the rectum has been confused with syphilis of this viscus." The pathological nature of this condition in the rectum was first pointed out by Sourdille (Archiv. gén. de méd., 1895, vol. i, pp. 531 and 697; vol. ii, p. 44).

The walls of the rectum are greatly thickened, stiff, and indurated. They form a cylindrical tube which does not collapse as does the normal rectum. The mucous membrane is frequently ulcerated, but not always so. The chief seat of infiltration by round cells and fibrous tissue, in which tubercle bacilli are abundant, is in the submucosa and circular muscular layers. Scattered over the mucous membrane are papillomatous outgrowths continuous with the submucosa. The solitary follicles are

swollen and inflamed. Outside of the muscular layer of the gut is a fibrous layer in which the blood-vessels present evidences of peri-endarteritis and endarteritis. The serous coat may be thickened or not; in some cases it is markedly so (Hartmann and Pellet). The whole presents a combination of tuberculous and simple inflammatory lesions. Lartigau claims that it is purely local, if not primary, tuberculosis, as the lungs and other organs are rarely involved.

The diagnosis of this condition is exceedingly difficult. Its treatment is said to be purely surgical. The writer, however, seriously doubts the propriety of operative interference in such a chronic, slowly progressive, tubercular condition. In the writer's opinion, local interference in such cases, just as in chronic tubercular fistula, would likely excite a new activity in the disease and do more harm than good. In all probability constitutional treatment, fresh air, and good food, together with such local treatment as is indicated for the prevention of secondary infection in the ulcers, would give better results.

Acute Tubercular Inflammation.—Occasionally there occurs an acute inflammation of the rectum in which the specific character is recognized by the presence of tubercle bacilli in the discharges and in the tissues themselves. Earle, working under Councilman, described this in 1887 as seen in necropsies, and later (Baltimore Med. College Alumni Journal, 1899) as observed in two clinical cases. It is characterized by "swelling of the mucous membrane, intense hyperæmia, and numerous small ulcers"; microscopically the tissues showed small-celled infiltration of mucous and submucous tissues verging upon caseation at points; numerous tubercle bacilli were present at these points, in the margins of the ulcers, and also in the infiltrated tissues where there was no ulceration.

In three instances the process was secondary to pulmonary tuberculosis, and in two it appeared to be primary. The two clinical cases recovered under thorough drainage, antiseptic irrigation, and constitutional treatment for tuberculosis.

CHAPTER VII

VENEREAL DISEASES OF THE ANUS AND RECTUM

VENEREAL diseases of the anus and rectum are comparatively rare in the United States. The enlarged foreign population has increased the practise of sodomy and pederasty, and every now and then one meets a case of primary venereal disease in these organs. The chief varieties are gonorrhœa, chancroids, herpes, and syphilis.

Gonorrhœal Proctitis.—This disease is not so rare at present as in the days of Bumstead, Van Buren, and Otis, who stated that they had never met with a case. Its symptoms are so nearly like those of simple acute catarrhal proctitis that until the discovery of the specific germ by Neisser one could not positively say whether a given inflammation was of a simple or specific nature, and its existence was therefore a disputed point for many years. In 1874 Bonnière made some interesting experiments with regard to the susceptibility of the mucous membranes of the body to gonorrhœal virus; in a patient with gonorrhœal ophthalmia and urethritis the pus from the infected regions was smeared upon the mucous membrane of the nose and anus. The nose showed no symptoms of the disease, but on the second day evidence of infection was seen about the anus, and upon the fifth day purulent gonorrhœal discharge from this part was noticed. He then injected the pus into the rectum through a hollow tube, but with negative results. From the repetition of these experiments he concluded that all the mucous membranes covered with pavement epithelium or supplied with papillæ and a superficial subepithelial network of lymphatic vessels are susceptible to the gonorrhœal virus; while those covered with cylindrical epithelium and having a superficial subepithelial network of veins are refractory.

Typical blennorrhagia of the anus is not an uncommon affection, especially in women, and it needs no argument or prolonged historical account to prove its existence. In the rectum the disease is comparatively rare, at least it is rarely diagnosed. Goslin, Billroth, Rollet, Allingham, Winslow, Bernard, and Tardieu, have all reported cases of the disease, but these writers based their opinions upon subjective

and circumstantial evidence, the specific germ not having been discovered at the time of their observations. Neisser himself has observed 2 cases of rectal gonorrhœa in which the microscope showed gonococci beyond the question of a doubt. Bumm quotes a case observed by Wolff with a distinct history of the practise of sodomy in which the discharge contained numerous well-defined gonococci.

Matterstock reported a case from the practice of Frisch in great detail; he not only examined the discharge during life, but also sections of the mucous membrane taken post mortem. The patient was a girl seventeen years of age, a sodomist by practice, who suffered from pain and burning in the rectum which was unbearable at defecation. These symptoms came on about fifteen days after her last coitus per rectum. The anus was funnel-shaped, reddened, and showed some loss of epithelium. There was a perianal eczema, and the pus oozed out between the swollen radial folds. This pus contained numerous gonococci, some free and others enclosed in the pus-cells. There were both cylindrical and squamous epithelial cells floating about in the pus, and now and then a pus-cell appeared which was literally stuffed full of gonococci so as to give the nucleus a crescentic shape.

The woman also had a discharge from the genitals, in which a similar exhibition of gonococci was found. Through the speculum the mucous membrane of the rectum appeared swollen, bright-red, and bathed in pus. At a distance of about 4 centimeters ($1\frac{2}{3}$ inches) from the anal margin there was a shallow erosion or ulceration of the mucous membrane. This patient died from pulmonary disease before the gonorrhœal affection was cured, notwithstanding the treatment had been kept up for about six months. The mucous membrane of the rectum was excised post mortem and the histological examination showed a partial disappearance of the Lieberkühn follicles, together with exfoliation of cylindrical epithelium; there was a typical proliferation of cells and connective-tissue infiltration of the borders of the ulcers and considerable infiltration of the muscular walls of the rectum by round cells containing single nuclei. In the polynucleated round cells were abundant gonococci, which were also free in the superficial layers of the mucosa. "Their presence was limited to the parts covered with cylindrical epithelium, while the infiltration of the round cells descended to the margin of the external sphincter" (*Annales de dermat.*, Paris, 1892, p. 330). These facts are practically confirmed by Hartmann and Quénu, who state that the limitation of the gonococci to the superficial layers of the mucous membrane is accompanied by diffuse inflammatory infiltration of the deeper tissues where the cocci are absent.

In 1892 the author reported (*Jour. Cutan. Venereal Diseases*) 3 cases

of gonococci of the rectum, in which the discharges, taken from 2½ inches above the anal margin, showed free gonococci, and pus and epithelial cells crowded full of them. Since that time 3 other cases have been observed, in 2 of which there was also blennorrhagia of the anus at the same time. In these 6 cases in which the rectum has been affected, the condition has not been as obstinate as that reported by Matterstock, although the pathological examinations have exhibited practically the same changes. It is a question whether his case did not have tuberculosis of the rectum complicating the gonorrhœa. As a matter of fact urethral gonorrhœa is always very slow in healing in tubercular patients, and the same may be the case in that of the rectum. While, therefore, one may say that the rectal mucous membrane is less susceptible to the gonorrhœal poison than is that of the urethra and anus, nevertheless it may be attacked. Especially is this the case when there is constipation or any other cause which produces slight traumatism of the mucous membrane during the presence of the gonococci in the rectum.

Etiology.—The cause of this disease is undoubtedly the direct inoculation of the mucous membrane of the rectum or anus by the gonorrhœal virus. This occurs through extension of the disease from the vulva to the anus and rectum, through careless handling of other parts affected with the disease, and consequent conveyance of specific germs to the rectum, or by unnatural coitus, the active party being affected with the disease. It has been claimed that it may occur through metastasis, but such an origin is unlikely.

Rollet (Dict. encyc. des sciences méd.) has reported a case in which infection occurred in a patient who suffered from an urethral discharge and introduced his finger into the rectum in order to produce a movement of the bowels. The finger was evidently infected with the discharge and thus inoculated the mucous membrane of the rectum. In Matterstock's case, and in 3 of the author's, the condition was brought about by the practise of unnatural vice, and this is perhaps the most frequent source in men. In women, however, gonorrhœa of the anus is usually due to secondary inoculation from vaginal discharges.

Symptoms.—The symptoms of the disease are sensations of uneasiness, itching, and heat about the anus, which may occur at any time from twenty-four hours to five days after exposure. These rapidly grow more distinct, the heat changes into a burning, the itching into pain, defecation becomes onerous, and the patient suffers constantly from dull, heavy aching in the sacral region. From the fifth to the seventh day the patient will probably have constitutional disturbances, the pulse and temperature becoming elevated. There is frequent desire to go to stool, followed by the passage of mucus and pus, and when

the faecal passages occur they are tinged with blood and accompanied by great pain. The discharge is at first thin and milky-white, but later greenish or brownish-yellow and very abundant in quantity. The appearance of the anus and rectum will depend upon the habits of the patient and the parts involved. If he be a sodomist the anus will appear infundibuliform, the sphincters will be relaxed, and there will be a pouting or exstrophy of bright-red oedematous mucous membrane about the orifice; the muco-cutaneous folds will be bathed in pus, excoriated or ulcerated, and fissures formed. Hæmorrhoids are not generally developed by this inflammatory process, and will not be present unless they existed before the infection.

When the disease involves the rectum the mucous membrane becomes bright red, swollen, tense, and painful. It bleeds upon touch, is bathed in a profuse secretion of muco-pus which dribbles from the anus, this orifice being imperfectly closed on account of the swollen folds. As the disease progresses patches of excoriation or ulceration occur. This ulceration is superficial, the edges are never undermined, and the base is granulating.

Condylomata, fissure, and submucous fistula may complicate the condition. The disease in the anus is self-limited, and if proper attention to hygiene and cleanliness is observed the patients will rapidly recover in the majority of cases. Probably a very small proportion of these cases are ever seen by physicians; the invalids being ashamed of their practices, suffer from their ailments and treat themselves rather than be exposed and degraded by the examinations and admissions which medical treatment would entail. If the disease extends above the internal sphincter it may persist for long periods and become chronic. While no case of stricture from this cause has been reported, it is not unreasonable to suppose that the same inflammatory deposit and cicatricial contraction which follows this disease in the urethra may also be developed in the walls of the rectum.

Diagnosis.—The diagnosis depends largely upon the presence of gonococci in the discharges. The profuse and purulent nature of the latter, the extreme irritation, and the coexistence of gonorrhœal inflammation in other organs, are all indicative of the nature of the disease. The final test, however, is the finding of Neisser's coccus. The specimens for examination must be collected in a most careful manner in order to eliminate any possibility that the pus comes from the genital organs; the anus is wiped off as gently and thoroughly as possible with absorbent cotton, then washed with an antiseptic solution of boric acid or bichloride of mercury, and then a speculum, such as the Kelly anoscope or the author's conical instrument, is introduced with the patient lying upon the left side or in the knee-chest posture.

The specimen should be taken with a platinum-wire loop from the wall of the rectum and not from the discharge which flows down into the speculum, lest by any chance some of the secretion from the anus should have been carried upward on the end of the instrument. Several specimens should be examined to corroborate one another. The methods of staining and the typical appearance of these gonococci are well described in books upon bacteriology and genito-urinary diseases, and need not be detailed here. Blake and Shulldham tell us that "when gonorrhœa has reached the chronic stage we may fail to find the diplococci or true gonococci, but encounter instead pseudo-gonococci, staphylococci, streptococci, or tubercle bacilli." Therefore the negative diagnosis should not depend alone upon not finding these bacilli. The history of the case, the appearance of the anus, the relaxed sphincters, the excessive discharge, the extreme pain on defecation, and the fissures between the anal folds should all be considered in coming to a final conclusion.

Prognosis.—The prognosis in these cases is favorable when the individuals are otherwise healthy. If, however, there be a tubercular diathesis or constitutional syphilis, manifestations of these diseases are likely to develop during an attack of rectal gonorrhœa, either of which renders the prognosis very serious and the course of the disease exceedingly protracted. This was the condition in the case reported by Matterstock, in which the disease lasted for over six months, showing little tendency to heal. The patient died at the end of this period from general tuberculosis. Why it should be so it is difficult to answer, but the fact remains that acute inflammations of the rectum, from whatever cause, are very liable to become chronic and intractable, even incurable, in cases affected with pulmonary tuberculosis. Therefore in cases with such diatheses our prognosis should be very guarded.

Treatment.—In anal gonorrhœa the parts should be kept clean by frequent sponging with antiseptic solutions, such as bichloride of mercury, Thiersch's solution, or solutions of creolin. Nitrate of silver in mild percentages, argonin, argyrol, and permanganate of potash rapidly destroy the gonococci, and are therefore very useful; when the disease has progressed to excoriation, or when ulceration has occurred, these local applications should be repeated two or three times a day, and the parts should be protected from rubbing against each other by small pledgets of gauze or cotton soaked in antiseptics. As soon as the gonococci disappear from the discharges, it is well, after cleansing the parts thoroughly, to apply some inert powder, such as stearate of zinc, oxide of zinc and calomel, subiodide of bismuth or aristol, insufflating it well between the mucous folds frequently enough to keep the parts dry. If there are condylomata they may be clipped off, or better,

still cauterized with monochloroacetic acid, and kept dry with the powder as before.

Where the ulceration is deep or sluggish, cauterization with nitrate of silver should be used.

The bowels should be kept open, but it is not well to induce frequent diarrhœal passages because they irritate even more than a solid, well-formed movement. If there be concomitant disease of the genital organs, the vagina should be tamponed regularly in order to avoid the dribbling down of the fresh discharges from these organs upon the anal surfaces. Ordinarily there will be no necessity to dilate the sphincter in such cases, and yet there may arise emergencies from pain and spasm of this muscle which would necessitate this procedure, which should be performed only as a last resort, as it would likely deepen the fissure-like ulcerations, increase the inflammation, and probably result in the infection of the rectum, whereas the disease was originally limited to the anus. When the disease has involved the rectum, active and energetic measures are requisite; irrigation with boric acid or very mild solutions of bichloride of mercury (1 to 10,000), or permanganate of potash (1 to 4,000) should be made two or three times a day. It is scarcely necessary to remark here that rectal enemata do not answer the purposes of irrigation in these cases. Permanganate of potash of a strength sufficient to be bactericidal is very irritating to the intestinal canal if left there for any time, and brings on intense and painful griping. Therefore it is important that a proper rectal irrigator should be used, such as that illustrated in Fig. 83; or if the anus be too tender for the introduction of instruments like this, two soft-rubber catheters should be introduced and the irrigation carried on by using one of these as an inflow and the other as an exit for the solution.

If there is much spasm of the sphincter and pain from defecation, dilatation of the muscles should be carried out under anæsthesia. In such conditions this operation may be resorted to earlier than in the cases in which the anus only is affected, as there will be no longer any fear of infecting the rectum, and the operation will furnish proper drainage and relief for the accumulated discharges.

Jullien advises the use of tannic acid as an application to the anus, but it is too irritating and not as satisfactory as the powders mentioned above. The application of pure ichthyol to the fissures will hasten the healing. If a submucous fistula should occur, it must be laid open at once and treated as an ulcer so that it can not act as a hiding-place for the gonococci from which they may break forth and reinfect the parts.

The irrigations should not be discontinued until eight or ten days after the discharge has entirely ceased, for the gonococci are liable to

be concealed in the follicles and the discharge may be lighted up again several days after it has once ceased.

Rest in bed is essential to successful treatment, especially when the rectum is involved; but this, like every other rule, must have a certain amount of elasticity. Cases inclined to anæmia, debility, and tuberculosis do not stand confinement in bed very well, and it is wise to alternate it with periods of mild exercise in fresh country air. Bitter tonics, cod-liver oil, predigested foods, and occasionally a little wine will be found of advantage in bringing up the strength of these patients, and sometimes accomplish a cure, whereas the simple local treatment has resulted in failure.

Chancroid of the Anus.—This is a not infrequent disease about the anus, and in this position the characteristics vary, as may be accounted for by the anatomical relations of the parts, their functional activity, and the hygienic care which is devoted to them by the lower classes, in which the affection is generally found.

In the United States it is comparatively rare, but in Europe and the Eastern continent it is not at all infrequent; nearly all of those observed in the author's clinic have been negroes or emigrants from southern Europe. Fournier states that he found the disease in 1 in 445 men and in 1 in 9 women suffering from venereal diseases. Periodi found 2 out of 83 cases of venereal disease, both in women. Sturgis found 8 in the same number of cases, all in women. Jullien is said to have found 14 cases of this condition in a total of 42 chancroidal ulcers (Quénu and Hartmann, *Chir. d. rectum*, vol. i, p. 404). Sick, in his review of venereal diseases in the Hamburg General Hospital from 1880 to 1890, found only 1 case of chancroid in the anus in 9,884 men, whereas in 11,826 women and infants he found 224 affected with it. From these figures one can readily observe that while in men chancroid of the anus is a very rare affection, it is by no means uncommon in women. This frequency in the female sex results from the close proximity of the anus to the genital organs and the facility with which discharges from the vagina may trickle down upon the anal region. It is due occasionally to contact with the male organ during the act of coition, and also to the comparatively greater frequency of the practise of sodomy than of pederasty. In the majority of cases chancroids of the anus are secondary to chancroids elsewhere, and therefore may be said to be due to auto-inoculation. They are usually limited to the perianal region and the anal canal, and rarely extend above the muco-cutaneous border unless they assume the phagedenic type, when they may involve the rectal mucous membrane and result in great destruction of tissue, even of the muscular wall of the gut.

Etiology.—There are two theories in regard to the origin of chan-

croids, in both of which it is assumed that the disease is the result of the local action of micro-organisms. The later schools have generally accepted the theory that a chancreoid is nothing more than an ulceration due to the inoculation of abraded surfaces by pyogenic microbes. They account for the special characteristics of the ulceration by referring them to the anatomical and physiological characters of the parts in which they occur; they hold that inoculation in this region with pus from other suppurating conditions, such as pustules, carbuncles, or furuncles, will produce characteristic chancreoids, and finally, that these sores occur in people who, owing to their bad hygienic habits, are susceptible to infection by micro-organisms. On the other hand, good authorities claim that the chancreoid is due to inoculation with a specific virus; they claim to have found certain bacteria always associated with the pyogenic micro-organism in chancreoidal lesions which are capable in pure cultures of reproducing the ulcers even when the inoculations are practised under aseptic precautions. In support of these theories they hold that a chancreoid always results from contact with the discharge from a chancreoid, and does not result from inoculation by discharges from other sources; that the chancreoid always runs a typical course in a given location; that auto-inoculation can be successfully repeated almost indefinitely, and that the inoculated ulcers, after two or three generations, cease to contain pyogenic microbes.

Ducrey, Welander, and Krefting "describe as the specific micro-organism of chancreoid a short, thick bacillus with rounded ends much like a dumb-bell, about $\frac{1}{2}$ a micromillimeter in length. The micro-organism is found in the protoplasm and between the cells, often in chains and groups" (White and Martin, Venereal Diseases, p. 274). They describe the characteristics of this ulceration, and state further that in no instance was auto-inoculation successful from a chancreoid in which this bacillus was not present. Many other observers have failed to confirm these observations, and inasmuch as proof afforded by the inoculation of pure culture is still wanting, one must conclude that the presence of a specific virus is *sub judice*.

Perianal Chancreoids.—Chancreoids occurring in the cutaneous tissue around the anus upon the perineal and coccygeal regions possess the characteristics of erosions more than ulcerations. They are shallow, do not discharge a great amount of pus, and show little tendency to spread. So frequently are they associated with the condition elsewhere that one writer has termed them "satellites of other chancreoids." They are more often multiple than single, as many as fifteen being seen in one case (Fig. 98). Some doubt the chancreoidal nature of such ulcers and claim that they are only inflammatory phenomena, but the facts remain that they are secondary to chancreoids elsewhere;

they are auto-inoculable; they are associated with hypertrophy and supuration of the lymphatics, and do not tend to burrow underneath the skin. These characteristics seem to distinguish them from general ulcerative conditions.

Anal Chancroids.—The sulci between the radiating folds of the anus form a most excellent lodging-place for chancroidal germs, and owing to the frequent breaks in the mucous membrane at these points inoculation occurs with the greatest facility. Here the chancroids appear as grayish-yellow fissures between the folds, and might be overlooked in the beginning except for the pain which they produce. They



FIG. 98.—MULTIPLE PERIANAL CHANCROIDS.

may be distinguished from simple fissures by the existence of chancroids elsewhere in the body; by their color, which is less bright and red; by the secretion of pus, which is much more abundant; by their being multiple, and finally by the fact that they are auto-inoculable.

So far as the pain is concerned there is no difference between these ulcers and the true irritable ulcer of Allingham. As a rule they involve the cutaneous and subcutaneous tissues freely, but seem to be arrested at the level of the mucous membrane. They may extend through one of the sulci between the radial folds until they reach the upper end of the anal canal. Here and below the folds they spread circularly around the anus and thus take on a sort of hour-glass shape. In this

position extreme chronicity is their chief characteristic. They advance slowly and heal equally so. The chancroid in one sulcus infects another and another until the whole anal circumference may be involved. The base is gray and sluggish, the secretion is free, sometimes fetid and tinged with blood, and occasionally little fistulas pass through the folds from one sulcus to another. Mollière has stated that if the case be complicated with hæmorrhoids the virulence may die out, leaving simple varicose ulcers which are not auto-inoculable (*Maladies du rectum*, p. 679).

Extreme pain following defecation brings on constipation in these cases just as it does in simple fissure. The patients in consequence suffer all the symptoms of irregular fæcal movements, loss of sleep, and reflex digestive derangements.

Treatment.—There is little tendency toward spontaneous healing, and frequently it is impossible to bring this about without forcible divulsion of the sphincter.

It should always be remembered before having recourse to the knife or forcible stretching of the sphincters, that these practices open up the lymphatic channels for the absorption of pus and may result, as in the case of Ricord and Fournier, in septicæmia, phagedæna, and death. One should therefore be slow in recommending such a radical measure. The excessive pain and the entreaties of the patient for relief, incline one to operate at once; but in one case in which the sphincter was divulsed, the ragged edges of the hypertrophied radiating folds cut off and a dirty, irregular, ulcerating mass surrounding the anus cleaned, the pain was relieved for twenty-four hours, then returned in all its severity and was followed in a few days by perianal abscess and a suppurating inguinal bubo. Either of these conditions might have occurred without the operation, but they were not present before or at the time of the operation, and it is possible that the procedure was the cause of them.

Conservative treatment therefore ought always to be practised, and practised patiently before undertaking any operation. The bowels should be kept open by mild laxatives, not by cathartics, and the parts cleansed by frequent bathing with antiseptic solutions and the application of soft, soothing dressings. The following treatment advised by the author in *Morrow's System of Genito-Urinary Diseases* has proved satisfactory in most of his cases:

The parts after being thoroughly washed and cleansed are touched with a solution that contains equal parts of carbolic acid and tincture of iodine. This is followed by washing with lime-water or blackwash and applying a powder of calomel and oxide of zinc. If the ulcer extends within the anus it may be necessary to introduce a speculum in

order to treat the parts thoroughly. One should do this even if the pain is severe enough to necessitate the administration of nitrous oxide or ethyl chloride for every treatment. Methylene blue, 10 grains in each fluid ounce, is an excellent application in these cases, especially where there is a tendency to chronicity or phagedæna.

The insufflation of orthoform upon these ulcers will in many instances relieve the acute pain produced by dressing them; it is not uniform in its action, however, for in some cases it has not given the slightest relief. Iodoform is said to possess a specific action upon chancroidal ulcers; in hospital practice one may use it freely, but its disagreeable odor has ostracized it so far as private patients are concerned. Aristol, antinosin, and resinol may all be used in place of the above powder, as may the mixture of oxide of zinc and calomel, which is simpler and much less expensive.

Chancroidal Ulceration of the Rectum.—Some few cases have been described in which the chancroidal ulceration has extended from the anus into the rectum, but these can not be considered true rectal chancroids. A chancroid of the rectum itself must originate in that organ and is usually due to sodomy.

Chancroidal ulcers occurring around the margin of the anus do not pass easily beyond this region, from the fact that the sphincter constantly closes this aperture and acts as a barrier to advancing germs. The faecal movements also sweep out before them the germs that may have nearly gained access to the rectal cavity. Those chancroids of the rectum which have been reported have generally been associated with others about the anus and upon the buttocks, and it is much more logical to attribute the latter ulcers to infection from within the rectum than *vice versa*.

That chancroids may extend from the anus into the rectum must be admitted. All who have had much experience in rectal and venereal diseases have seen such cases. The fact that the invalids affected do not even give up their vicious practices while the sore exists renders it possible that the virus may be carried upward into the rectum, and the ulcers are thus the result of auto-inoculation. On the other hand, a certain variety of chancroid known as phagedenic has a persistent tendency to progress in one or more directions, and if the sphincter muscle is relaxed, as it frequently is in this class of patients, there will be no obstructive barrier against the progress of the disease into the rectum. Mason, Van Buren, and others have reported such cases as this, and claim that they have seen strictures of the rectum caused by them.

Symptoms.—The symptoms of chancroids of the rectum are in the main those of ulceration, viz.: diarrhœa, tenesmus, and a profuse dis-

charge of pus, sometimes tinged with blood. There may or may not be pain. The patient is generally unwilling to confess that he has any knowledge of the cause of his disease.

The ulcers are irregular in shape, grayish in color, and shallow with ragged borders and pale, feeble granulations. They may be stationary or have a tendency to rapidly extend. Occasionally they involve the deeper tissues of the gut, invade the submucous and muscular coats, and may even destroy the sphincter itself. Under such circumstances they are termed phagedenic. When a tendency to spread exists the pus burrows underneath the mucous membrane, and submucous or submuscular fistulæ may develop.

Treatment.—The management of chancroids within the rectum is practically the same as that of acute ulceration of this organ. The patient should be confined to bed. The bowels should be kept regular but not diarrhœal, and the rectum should be irrigated with antiseptic solutions, such as boric acid, thymol, bichloride of mercury, carbolic acid, etc., two or three times a day. If the ulcer appears sluggish, slightly stimulating applications will sometimes be useful. If it has a tendency to progress rapidly, the application of pure nitric acid or the actual cautery to its edges will sometimes check this. Iodoform suppositories are very useful in these conditions; though pure carbolic acid applied once in three or four days, and the daily insufflation of the zinc and calomel powder upon the ulcer produces excellent results. Pure ichthyol acts well in fissures when they exist. A bland, unstimulating diet should be enforced, and morphine should be administered if necessary to relieve the pain and control too frequent stools.

Phagedenic Chancroid.—Any chancroid may assume a phagedenic condition, which may be either acute or chronic. This change in the nature of the ulcers is due to constitutional conditions. Diday and Doyon (*Thérapeutique des malad. véner. et des malad. cutan.*, 1876, p. 184) have proved this fact by experiments with inoculation. They have shown that if a healthy person is inoculated from a phagedenic chancroid he develops only a simple, soft sore; and on the other hand, if a person who suffers from a phagedenic chancroid be inoculated from a simple chancroid, the point of inoculation will at once take on the phagedenic symptoms. In the *acute form* the phagedenic chancroid resembles an intense cellulitis at first. The deep tissues become involved as well as the superficial, the parts are swollen, cedematous, and painful, the temperature is elevated, the pulse rapid and feeble, and the tongue dry and pasty. Great destruction of tissue results, large suppurating cavities form, and the overlying teguments slough away. The lymphatics in the vicinity soon become involved and suppurate. Rollet states that the pus from these buboes is not auto-inoculable,

but this statement has not been corroborated. One can not say that these general symptoms are in any way peculiar to chancroids. They are comparable to pyæmia and due to the absorption of pyogenic bacteria, which are always present in chancroidal ulcers.

Metastatic abscesses may form in any portion of the body, and unless the disease is rapidly checked it is likely to prove fatal. Where the patient recovers, it is generally through a prolonged convalescence with resulting large cicatrices in the region of the sloughs.

In the chronic form of phagedenic chancroid the onset is very insidious; the ulcer first shows a sluggishness in the production of healthy granulations, especially at one or the other of its borders. At the anus it has a tendency to extend from without into the rectum. While it is cicatrizing at one area it advances at the other. There are no marked constitutional symptoms, and the ulcer is less painful than acute ulcerations about the anus usually are. The lymphatic engorgement is less marked than in the other varieties of chancroids, and suppuration of the glands is unusual. The ulcer tends to spread superficially and often involves only the mucous and submucous tissues. Occasionally, however, it may involve the deeper tissues, and cause inflammation and cellular infiltration of the muscles that surround the anus and rectum. It is only in these rare instances in which the ulceration involves the muscular walls that chancroids can be said to produce a stricture of the rectum. Duprès (*Archiv. J. de méd.*, 1868, p. 257) first described this condition of phagedenic chancroid as an etiological factor in the production of stricture of the rectum; Maçon (*Amer. J. of Med. Sci.*, 1873, p. 22) wrote in confirmation of his theory; Van Buren (*Diseases of the Rectum*, 1881, p. 237) stated that he had seen a chancroid of the anus become phagedenic, extend into the rectum, and at a later period had verified the existence of a stricture due to its cicatrization; Bridge (*Archiv de Dermat.*, 1876, p. 122) recorded the case of a stricture of the rectum due to chancroidal ulcers in which it was necessary to perform a lumbar colotomy in order to relieve the intestinal obstruction.

The weight of evidence seems to support the view that stricture of the rectum may be produced by phagedenic chancroids. The author has seen three cases of chancroids of the anus which had left contraction of that orifice, but the strictures never ascended higher than the internal sphincter, and could not therefore properly be called strictures of the rectum. On the other hand all of these cases were treated by cauterization, either by chemical agents or the actual cautery, and the question therefore remains in doubt whether the stricture was produced by the cauterization or by the chancroid itself.

Treatment.—In the acute variety the patient's general condition is of paramount importance. Abscesses should be evacuated as soon as possi-

ble; the operator should be very careful not to make too wide incisions lest he open up healthy tissues for infection with the virus; yet nevertheless the inflamed cellular tissue should be freely incised. After the abscesses have been opened the parts should be frequently irrigated with antiseptic solutions, and in the meantime hot poultices should be applied in order to increase the circulation and limit the sloughing as much as possible. The temperature should be controlled either by cold sponging, or, if necessary, by the use of some of the modern antipyretics. These latter should be used with the greatest caution, as they are all depressing, and the chief difficulty in these conditions is to maintain the patient's strength until the pyæmic processes can be controlled. Tincture of the chloride of iron should be frequently administered, and bichloride of mercury in small doses will generally have a very good effect. Quinine seems to act well in some cases, while in others it excites the patient too much to be of benefit.

Assuming the condition to be one of sepsis due to the absorption of pyogenic bacteria, and not to any specific chancroidal virus, one should apply the principles of antiseptic surgery and even resort, if necessary, to intravenous saline infusions or the injection of antistreptococcus serum.

In the chronic form there appears to be a local condition of lowered vitality in the parts. The fact that the ulcer heals upon one border while it advances upon the other shows that the tissues of the latter have less power of resistance than those of the former. Where a well-developed, healthy granulation is once established, the progress of the disease in that direction is checked. Sometimes mild astringent or cauterizing agents suffice to produce this granulation and thus check the advances. Nitrate of silver may be tried at first, and following this one may have recourse to nitric or chromic acid, caustic potash or acid nitrate of mercury, or finally to the Paquelin or galvano-cautery itself.

The modern improvement of the galvano-cautery enables us to apply it now at every point in the circumference of the rectum, and if thoroughly done it will generally check the disease. This application, however, is not without its dangers, as a patient has died from shock within a few hours after the application of the Paquelin cautery to a phagedenic chancroid. One should therefore prepare his patient for such an ordeal by rest in bed, general constitutional and nerve tonics, and by strong stimulation.

After the cauterization the parts should be dressed with a 5- to 10-per-cent solution of picric acid, which relieves the pain of burns.

Maclaren (Edinburgh Clin. and Path. J., 183, p. 697) has recorded the case of a woman with a "pellagrous, phagedenic chancroidal ulcer" which, notwithstanding cauterization and treatment by all recognized

methods, continued for eight years without material improvement. It was noticed in this case that the contact of the menstrual discharges with the parts that had healed immediately caused them to break down again. He therefore scraped off the granulations, dissected out the inflamed tissues beneath, and brought the parts as near together as possible by button sutures. After this the vagina was tamponed and kept so until some time after her recovery, particularly at the menstrual periods. Other operators have not been so successful in their efforts to check phagedæna by excision. The experience of most has been that the fresh edges of the wound rapidly assumed the old phagedenic condition, and the area of the ulcer is only increased. On the whole one must largely depend upon constitutional treatment, good hygiene, and occasionally the application of the actual cautery for the cure of this condition.

Complications.—Chancroids of the anus and rectum may be complicated by the coexistence of true Hunterian chancre in the same lesion; but mixed sores present no characteristic features at first beyond those of typical chancroids, which proceed in their regular course for some days or weeks, when the bases become indurated and the cicatrizing edges undergo cellular infiltration. At the same time the ulcer will secrete more pus than a true chancre and is auto-inoculable.

The appearance of secondary syphilis is the pathognomonic evidence of the combined nature of the sore.

Chancroids may exist in connection with secondary syphilis. Syphilitic ulcerations and even broken-down mucous patches may resemble chancroidal ulcers in a marked degree, and as these ulcerations always contain pyogenic germs, auto-inoculation may produce a pustule and yet not be convincing evidence of their chancroidal nature. On the other hand, if one assumes in these cases that the disease is chancroidal, he may overlook the syphilitic nature of the ulcers. Anti-syphilitic treatment should never be resorted to until secondary lesions appear to clear up this confusion.

The occurrence of fistula, fissures, and stricture as complications of chancroidal ulcers have been mentioned. There is one form of fistula, however, which deserves especial mention. In chronic chancroids without any marked phagedenic tendency about the anus there occasionally occur small subtegumentary fistulæ that extend upward underneath the radial folds or columns of Morgagni; they may penetrate the mucous membrane above, but they are generally of the incomplete variety. When the chancreoid assumes the fissure-like type these little fistulas are very likely to be overlooked unless the parts are carefully examined with a very fine probe. When they are not recognized and treated the discharge from them keeps up the ulceration below in

spite of all the treatment which one can apply. These little tracts should be laid open freely and cauterized either with pure carbolic acid or with the galvano-cautery. The reflex complications which occur in chancroids of the anus and rectum are not peculiar to this particular form of ulceration; they occur in all the inflammatory involvements of these organs and include dysuria, frequent and painful urination, irregularities of the menstrual functions, and sometimes in pregnant women who have no symptoms of syphilis, abortion.

SYPHILIS

This protean disease manifests itself in primary, secondary, and tertiary lesions in the skin about the anus, in the anal canal, and within the rectum. It is seen at all ages and in every class of society. It may be inherited from either parent, or the child may be infected with it during birth through the presence of the disease in the mother's genitals. It is acquired through natural and unnatural vice, through accidental or innocent contact with diseased persons, or indirectly through the use of toilet articles which have been used by syphilitics.

Chancre.—The initial lesion of syphilis is always a chancre. It occurs in the anus somewhat more frequently than was formerly admitted. Pean and Malassez, combining the reports of Bassereau, Fournier, Clerc, Martin, and Carrier, present (*Etude clinique sur les ulcérations annales*, Paris, 1871, p. 88) the following statistics: In 1,237 extragenital chancres of all regions in men, they found 7 chancres of the anus, in 175 in women there were 14 chancres of the anus. From these figures it would appear that the infection occurs at the anus in 1 out of 177 cases in men and in 1 out of 13 cases in women. Sick (*Jahrbücher der Hamburgischen Staats-Krankenanstalten*, 1890, t. 2, Leipsic, 1892, p. 453), in summing up the venereal diseases occurring in the general hospital of Hamburg, 1880 to 1890, found in 9,884 males affected with venereal diseases 1,010 mucous patches, 1 true chancre, and 1 chancroid of the anus; in 11,826 females and infants affected with the same diseases there were 986 mucous patches, 9 true chancres, and 224 chancroids of the anus, 404 anal fissures, 3 perineo-anal chancres, 1 anal gumma, 2 rectal gummas, and 10 strictures of the rectum.

Salsotto, quoted by Quénu and Hartmann, found in 201 extragenital chancres only 2 of the anus. Jullien (*Traité pratique des maladies vénériennes*, Paris, 1879, p. 583) found 11 chancres of the anus in 2,171 cases of extragenital chancres in men and 39 in 473 cases in women, making a proportion of about 1 in 119 in men and 1 in 12 in women. Quénu and Hartmann, gathering statistics from the services

of Professor Fournier, of Paris, and published at different times by Nivet (Thèse de Paris, 1886-1887, No, 205), Morel-Lavalles (Annales de dermat. et de syphilog., 1888, p. 375), Veslin (Annales de dermat. et de syphilog., 1890, p. 317), and Feulard (Annales de dermat. et de syphilog., 1890, p. 320, and 1892, p. 805), determine that in 778 extragenital chancres there occurred 52 chancres of the anus, of which 26 were in males, 25 in females, and 1 in an infant. Fournier's latest statistics (Les Chancres extra-génitaux, 1897, p. 485) give in a total of 10,000 chancres, 52 of the anus and rectum, 37 being in men and 15 in women. The proportion in the two sexes is 1 in 192 cases in men and 1 in 25 cases in women. Duhring, of Constantinople (Gaz. de méd. de Paris, 892, p. 381), states that out of 42 extragenital chancres 31 were found about the anus or within the rectum; what is still more remarkable is the fact that 26 out of the 31 were in children, and of the 5 in adults 4 were in males and 1 in a woman. The disparity between these figures and those of Sick seems to indicate how much more frequent is the practise of unnatural vice in the French capital than in its German neighbor. The statistics of Duhring from the Turkish capital are too horrible for belief. Pospellow (Archiv f. Dermat. u. Syph., 1889, Nos. 1 and 2) and Neumann (Wiener medic. Wochenschr., 1890, No. 4) found in 282 cases of extragenital chancre 8 chancres of the anus, all of which were in women. In over 3,000 cases of rectal diseases treated at the Polyclinic Hospital there were only 3 cases of true chancre of the anus, 2 of these being in boys and the other in a woman. These facts show that except in those countries where the practise of unnatural vice is frequent the disease is very rare and largely confined to the female sex. This is also in keeping with the anatomical facts, as referred to in the earlier portions of this chapter. In men the occurrence of the disease in these locations is almost positive evidence of the practise of sodomy, but in women the possibility of the infection of these parts through their contact with the male organ or through the discharges from the vagina render them much more liable to anal chancres. All statistics, however, upon this subject must be taken *cum grano salis*, especially in men. The shame of such practices as cause this local inoculation in males deters them from consulting the doctor, and as the symptoms are not unbearable, probably a large proportion of them are never seen. Possibly many cases of secondary syphilis, in which the patient denies any knowledge whatever of the original source or site of the infection, may have originated in true chancres of the anus or rectum.

The initial lesion may occur in the skin surrounding the anus, between the radial folds, in the anal canal, or in the rectum itself. Those below the ano-rectal line are termed anal, and those within the

sphincteric contraction above this line are termed rectal chancres. The contagion, as admitted by most observers, is carried in the blood and in the secretions from a chancre or from secondary lesions; the normal secretions, such as saliva, sweat, milk, and semen, are said not to convey the disease unless mixed with discharges from some inflammatory lesion. Whatever the source of the contagion, the primary infection is always a true, hard chancre at the seat of inoculation. The infection may occur through immediate contact, and generally does so occur, but it may also be brought about by mediate contagion, such as the use of towels, sponges, cloths, syringes, etc., which have been previously used by patients affected with the disease.

The author saw a case of hard chancre of the anus in a private patient some years ago, in whom the disease was caused by the use of a syringe for taking a rectal enema, the instrument having been used by a brother who was suffering from constitutional syphilis. While such instruments may be used with impunity so long as there is no lesion in the skin or mucous membrane, the moment they come in contact with a fissure-like crack, an abraded hæmorrhoid, or a small erosion of the skin, infection is very likely to occur.

Anal Chancres.—The most common seats of these chancres about the anus are in the skin just outside of the radial folds and in the sulci between these folds. A sufficient number of observations of this character has not been made to justify any generalization with regard to the comparative frequency in location. Of three cases of chancre of the anus one occurred in the skin just below the radial folds and the other two between them. Those which develop upon the skin around the anus do not differ materially from the cutaneous chancres on other portions of the body. They are generally superficial and circular in the first stages, resembling abrasions; their bases are indurated, the edges red but not infiltrated, and the center dark, grayish, and sometimes fissured. After they have existed for a week or ten days the edges become infiltrated and the whole mass hard, indurated, and resisting. The sores are said to be painless, but there is always more or less discomfort produced by them whether upon the skin or mucocutaneous border.

When they occur between the radial folds or at the anal margin they usually assume the shape of fissures. The distinction between them and true fissure in ano is said by Ball, Quénu and Hartmann, Allingham and Kelsey, to be easily made, owing to the absence of pain in the parts. Two patients affected with chancre between the radial folds suffered just as acutely after movement of the bowels as they would have done from any other fissures of the same extent and location. The only difference between these ulcers and true fissure was that they were

indurated and healed rapidly without even stretching the sphincter; whereas the majority of true fissures have no such tendency. In the first stages of chancre occurring in this location it will be very difficult to decide between these two conditions, as the induration is not well marked until ten days or two weeks after the development of the initial lesion. The bases, it is true, are hard and infiltrated at an earlier period, but as it is difficult to grasp these between the finger they give the impression of cicatricial thickening rather than cellular infiltration. In one chancre between the folds the base was at first a brownish-gray; this, however, soon disappeared and left a bright-red, granulating surface which bled easily upon stretching the buttocks apart. In both these cases the chancre healed in about four weeks, and in four cases that were observed the constitutional symptoms of syphilis developed within the first eight weeks.

Where the chancre occurs a little higher up, or intra-anal, Hartmann states that the patient complains of a sense of uneasiness and discomfort, never of an acute pain. In the cases that occur upon the skin and between the radial folds one may see the lesions by gently separating the buttocks; in the intra-anal form it is necessary to pull the edges of the anus forcibly apart and sometimes even to use a speculum in order to observe them. Here the chancre assumes the circular or round form at first, at least it appears so when the parts are stretched open. The edges are slightly elevated, the base is smooth and indurated, although this latter condition, it is said, is difficult to make out. The mucous membrane just above the edges of the ulcer appears to be perfectly healthy. The edges of the ulcer are rose-colored, and the ulcer itself secretes a very scanty muco-purulent discharge, sometimes slightly tinged with blood. If the discharge is abundant it is evidence of a mixed or complicated sore.

Chancre may develop upon a prolapsing or hypertrophied external hæmorrhoid (Jullien). In such cases the development is most characteristic and the induration very great. Where the chancre involves the muco-cutaneous border there may develop intense induration of the cutaneous tissues below, even almost cartilaginous in its nature (Neumann, *Annales de dermat.*, Paris, 1893, p. 1326).

Mixed Sores.—Chancre may be complicated with chancroid, thus causing a mixed sore, as has been described in a preceding section.

Auto-inoculation is never a safe diagnostic guide in this region because of the possible presence of pyogenic germs in the ulcer which might make it successful even in cases of true chancre. Simple hard chancres may be so irritated and infected by the passage over them of faecal matter that they assume a phagedenic type resembling chancroidal phagedæna. Thus one must admit a phagedenic condition as complicating

true chancre, such as is described by Medina (Thèse, Paris, 1891-'92, No. 288), and Quénu and Hartmann (*loc. cit.*, vol. i, p. 79).

Course of the Disease.—The experience of Fournier, Carrier, and others, who state that the course of these local sores is a very slow one, has not been confirmed; for those which the author has seen have healed comparatively promptly. They say that the parts may be inflamed, assume a dark venous color, sometimes resembling intertrigo, the radial folds may become engorged, and in the midst of these diffuse lesions the chancre itself may be passed unobserved. Such a diffused congestion of the parts must be very rare, and would indicate to the writer a mixed infection.

Sometimes the folds bordering upon the ulcer become hypertrophied and develop into muco-cutaneous tabs. French authors speak of these as condylomata. On this side of the Atlantic the term is not used with this significance; here it means vegetating excrescences upon the skin or mucous membrane which have a warty or papillomatous character. These develop about the anus in the course of syphilis, but they are among the secondary manifestations of the disease, and not connected with the initial lesion. The rapidity with which the chains of inguinal glands upon both sides of the body become successively enlarged is one of the most reliable diagnostic symptoms of chancre of the anus. The development of secondary symptoms, however, is the only absolute proof with the initial lesion.

The rapidity with which the chains of inguinal glands upon both sides of the body become successively enlarged is one of the most reliable diagnostic symptoms of chancre of the anus. The development of secondary symptoms, however, is the only absolute proof that any given sore is syphilitic. Chancre with minor degrees of hypertrophy of the inguinal glands may be the beginning and end of syphilis, or a patient may have a true chancre without any secondary development, and years later be affected with a true outbreak of tertiary syphilis; these courses indicate that the systemic resistance at the time was sufficient to overcome the virus of disease, but the seeds of constitutional infection remain latent, and at some period of depressed vitality overcome this resistance and develop with great intensity. At other times the secondary development may be so mild that it does not make any impression on the patient, and passes away only to reappear years afterward in the shape of severe tertiary lesions. These facts emphasize the necessity of the most careful observation for considerable periods of time after a suspected sore, and also to guard the reader against a too favorable prognosis in any such case.

Chancre of the Rectum.—Chancre of the rectum proper is one of the rarest of diseases. Martineau (*Leçons sur les déformations vulvaires*

et anale, 1886, pp. 152, 174, 176) has reported three cases, 1 entirely above the internal sphincter, 1 on its level, and 1 between the two sphincters. Fournier himself says that he has seen 4 cases, but of these the diagnosis was absolutely certain in but 1 (*Les Chancres extra-génitaux*, Paris, 1897, p. 486). Mollière (*loc cit.*, p. 636) only credits one of these, that of Fournier. Ohmann-Dumesnil (*St. Louis Medical and Surgical Journal*, 1900, p. 294) has reported two chancres, one on the verge of the rectum and the other 3 inches above the anus, both in women. Trelat and Vidal de Cassis also claim to have seen cases. Hartley (*Journal of Cutaneous and Genito-Urinary Diseases*, 1891, p. 218) has reported a most carefully observed and indubitable case as follows:

J. McG., thirty-two, male, U. S., organist, was admitted to the Roosevelt Hospital, September 20, 1890.

Family History.—No tubercular, renal, or cardiac ailments. No rheumatic history.

Personal History.—No tubercular, renal, or cardiac disease. Denies all previous venereal diseases. Had dysentery some years ago.

Present Condition.—About three weeks ago the patient noticed severe pain at defecation, and a small lump just within the anus; pain now continuous; tenesmus after each passage; blood has been present at stool at times. He has suffered from constipation for a long time.

An ulcer is found just 1 inch from the anal margin. It is about the size of a quarter of a dollar. The base is indurated and the ulceration is very superficial. Sacral glands felt enlarged. There is no evidence of any other lesion.

Operation.—September 20th. Usual antiseptics. Bichloride and boric-acid irrigation of the rectum; sphincter dilated. Bivalve speculum used. The ulcer is seen just 1 inch within the rectum; it is superficially eroded with a distinct but not cartilaginous base.

Excision of Ulcer.—Cauterization with Paquelin cautery. Iodoform powder. Suppository of opium, gr. ij; opium pill, gr. j, t. i. d. Patient ordered to wards and to be watched for any evidences of syphilis. September 25th: movement of bowels; daily irrigation. September 30th: ulcers healing rapidly. October 1st: *roseola over the surface of the chest and abdomen*. October 5th: discharged from the hospital improved. October 20th: patient applied to-day for treatment in the out-patients' department, stating that his medicine had been used up and that he desired more. Patient presents a papular syphilide involving the face, forearm, trunk, and portions of the extremities. The ulcer of the rectum is healed. Patient is put upon antisyphilitic treatment.

A careful inquiry as to the mode of infection was instituted. Patient for the first time during his treatment here admits that three weeks before admission to the hospital, while in Baltimore, he was the victim of another man.

After this confession the patient was lost to view.

The painlessness of the lesion described by some authors is not borne out by the cases of Fournier and Hartley, both of whose patients complained of severe pain, the sensation of a lump or foreign body

within the anus, tenesmus after each stool, and the occasional passage of blood with the fæces. The existence of chancre within the rectum is very positive evidence of sodomy, although it is possible for the infection to occur, as in the case of anal chancre, through the use of an infected syringe-tip.

Symptoms.—The symptoms of chancre in this location, as drawn from a few experiences, are more or less acute pain at the time of or following defecation; a discharge of muco-purulent or purulent secretion, with or without the presence of blood. Examination gives to the finger a sensation of an ulcer slightly depressed in the center, with clear-cut borders and an indurated base. These ulcerations are very superficial. The sacral glands may be enlarged if the sore has existed for any length of time. One would not expect to find the inguinal glands enlarged at so early a period as in chancre of the anus, owing to the fact that the lymphatics above the sphincter ascend by a different route from those below.

The histology of chancre of the rectum does not differ from that of the sore found elsewhere except in the tissues involved.

Treatment of Initial Lesion.—The treatment of chancres of the anus and rectum is practically the same as that for the lesion elsewhere, with the exception that in these locations it is much more difficult to keep the parts clean, and it is more usual to have the sore complicated by septic conditions. Great care, therefore, is necessary to avoid these complications. When the chancre is outside of the anus frequent washings with antiseptic solutions should always be practised. After the parts have been thoroughly cleansed and wiped dry, one should apply some of the powders mentioned in the treatment of chancroid. The mixture of equal parts of oxide of zinc and calomel is excellent, because it is devoid of any disagreeable odor, it is inexpensive, and seems quite as effective as any other powder. There might be an objection to the use of calomel under such circumstances because of the possibility of its being absorbed, and thus masking the constitutional syphilis or delaying its appearance. When ulcerative lesions are sluggish and inclined to suppurate, antinosin or tincture of iodine stimulate them to granulation, and apparently hasten the healing.

After the powders have been applied, the folds of the buttocks and the radiating folds of the anus should be carefully separated by small pledgets of gauze or absorbent cotton to prevent the friction or abrasion occasioned by clothing or by their rubbing together.

When the chancre is well within the anus or inside of the rectum, it will be necessary to introduce a speculum in order to cleanse the part thoroughly and apply any medication. Under such circumstances the fenestrated conical speculum is by all means the best, as it can be intro-

duced with comparatively little pain, and the remedial measures applied. Suppositories containing such drugs as iodoform, aristol, and nosophene will be advantageous if the ulcer is well within the rectum, but useless if it is in the anal canal. The bowels should be kept open, but not by drastic cathartics, which bring on diarrhœa and irritation of the rectum; one smooth, gentle movement daily is the most satisfactory, and this can be obtained by a morning enema. If the ulcer is in the rectum, it may be necessary to use opium to prevent too frequent stools. Irrigation of the rectum by boric acid or mild bichloride solutions should be used after each stool. In Hartley's case the ulcer was excised and the base cauterized with the actual cautery, and yet secondary symptoms promptly appeared. This method of treatment has not met with the general approval of the profession, and experience with it has not been such as to encourage its adoption in the treatment of anal or rectal chancres. If kept clean and dry, and the patient remains quiet for two or three weeks, these lesions will generally heal and leave nothing more than an indurated spot, which gradually disappears, so that its site is unrecognizable.

Secondary Manifestations.—Secondary syphilis manifests itself in this region in a variety of ways. Around the anus one may observe the same lesions which occur upon the skin elsewhere in the body. They are modified to a certain extent, however, by the close approximation of the parts and their habitually moist condition. Thus, the macular, scaly, moist papular and tubercular syphilides in this region are very liable to be transformed into mucous patches or ulcerative conditions. These two types are therefore most frequently seen.

Mucous Patches.—Next to the mouth and throat the anus is the most frequent seat of mucous patches. In women they occur at some time in a large percentage of cases of constitutional syphilis. They frequently begin in the vulva and spread to the anus, but it is not at all rare to see the first patch develop in the latter situation.

The course of their development is as follows: There is first an erythema between the folds of the buttock. This may occur even before the initial lesion heals; when the latter is located in this region it may imperceptibly change into the mucous patch, thus occasioning a sort of *transformation in situ*. In point of time the patch corresponds to the macular eruption upon the skin. It appears at first as a dull red zone, which gradually fades into the surrounding skin. There is a sort of œdema below the epidermis which elevates the epithelium above the derma. This œdema is not sufficient to produce a vesicle or bulla, but the epidermis becomes macerated and falls, or is rubbed off by the friction of the parts, leaving a superficial erosion. At this period the condition may be mistaken for an acute eczema. There is little itching,

however, the discharge is scant and thin, and there is no cracking of the tissues, as occurs in that disease. Soon afterward there forms upon the surface a grayish-white pellicle or membrane somewhat elevated above the level of the skin. The cutaneous tissue beneath this is infiltrated and hypertrophied in the superficial layers. These changes constitute the mucous patches. They may be single or aggregate, and involve the entire circumference of the anus. Generally they are disk-shaped, and situated upon the two folds of the buttock, which lie in contact with one another. In the second stage the patch appears as a simple, elevated, pearly spot situated upon a supple base of very slightly indurated skin, and is termed the "plaque porcelainique." As the condition develops, the patches become more elevated, but are pressed flat by the buttocks, and secrete a thin, foetid fluid which keeps the parts moist and irritated. In this stage, on account of their flat surface and broad bases, they are termed "condylomata lata" (Plate V, Fig. 1). The papillæ over which these patches are situated, through cellular infiltration and irritation by these secretions, soon begin to hypertrophy; the branches shoot upward, the vessels multiply and dilate, the summit of the growth increases in weight, while the base remains the same, and there is developed a cauliflower growth distinguished as vegetating mucous patches or venereal warts. This condition, while due originally to specific disease, is no longer a purely syphilitic affection; but, on the contrary, a papillomatous growth, which does not yield in the least to internal antisyphilitic medication. The fact that the secretion from these growths is auto-inoculable would seem to prove their non-syphilitic nature. Within the rectum mucous patches are said to be very rare, but the author believes they are more frequent than is supposed. Bärensprung (*Charité-Annal.*, 1885, Bd. vi, p. 57) long ago observed them during the eruptive stage of syphilis, and Muron (*Gazette méd.*, 1873, p. 8) suggested that stricture might result from their ulceration. Mollière reported a case in which the patch was 5 centimetres above the anus. The colored drawing (Plate III, Fig. 1) shows a pear-shaped mucous patch on the middle Houston's fold, which was demonstrated at the clinic in May, 1900. They give rise to no marked symptoms, and are therefore probably overlooked.

E. Lang, of Innsbruck, examined 110 cases (45 men and 65 women) in the eruptive stage of syphilis with reference to secondary manifestations of the disease within the rectum. He found plaques or papules in 16 cases. They were located generally on the posterior wall, but sometimes on the sides, and in 3 cases involved the entire circumference. The plaques were frequently ulcerated, but in only 3 was there pain in defecation or loss of blood. In 1 case, in which the plaque was situated very high, the patient suffered from tenesmus (E.

Lang, *Pathologie und Therapie der Syphilis*, vol. i, p. 325). This experience emphasizes the importance of early rectal examinations in constitutional syphilis, and proves that specific ulcerations often occur here unobserved early in the disease. These ulcerations may excite inflammatory processes which result in stricture later on. Such strictures, although originating in syphilitic ulceration, may be purely fibrous and possess no specific pathological characteristics, such as gummata and endarteritis.

Small Red Papules.—Along with, or sometimes before the appearance of the mucous patches, there may occur small red papules around the anus or between the radial folds. They rapidly break down and leave small ulcers, which assume the shape of fissures when they occur in the latter position. These fissure-like ulcers may also occur independently of the papules. They are said to be painless, but one has to see only a few such cases to have his mind disabused of any such misconception. They are distinguished from the ordinary fissure by being multiple, of a grayish color, with raised edges, slightly indurated base, and by the existence of other manifestations of syphilis in the individual. In one case a small red papule was seen 1 inch above the sphincter.

Secondary Ulcerative Lesions.—Between the secondary and tertiary ulcerations of the anus it is difficult to draw the line. Lesions ordinarily considered to be secondary may come on years after the infection. The author has reported elsewhere a typical mucous patch appearing in a patient nearly four years after the initial lesion, and as ulcerative syphilides are later manifestations than mucous patches, it is reasonable to suppose that they may occur at even more remote periods.

Where the disease runs successively through the primary, secondary, and tertiary stages it fades so imperceptibly from one into the other that it is impossible to state when one begins and the other ends. As a rule, secondary ulcerations are characterized by their early development, shallowness, small destruction of tissues, and healing without leaving cicatrices. They may, however, vary in these respects, sometimes being very destructive, when occurring in the early history of the disease, and at other times they may occur in superficial form long after the initial lesion and secondary cutaneous manifestations have passed away. Thus it seems that the character of the ulcer is of much more importance to determine the stage to which it belongs than the period of time at which it appears, and ulcerations having secondary characteristics, as just described, may occur within the first few weeks after the primary lesion, or even years afterward, and clinically and histologically they are identical in both periods. They are secondary ulcerations at whatever period of the disease they occur.

The method of their development is various. Tarnowsky says: "Where a constitutional syphilis exists, but without any positive evidence of the disease, an abrasion or local inflammation may take on the characteristics of syphilitic ulceration, and healing, leave a characteristic syphilitic cicatrix, smooth, white, depressed, and pigmented at its borders." But this type of ulceration ordinarily occurs in the tertiary stage.

Mucous patches through infection or the virulence of the disease may break down and leave ragged ulcers about the anus, such as the French call "rhagades." Papular, macular, and pustular syphilides, occurring about the anus, rapidly become ulcers. They may also begin as local inflammatory effusions or cellular infiltrations. As these increase the circulation of the parts becomes choked, the tissues break down, and there results an irregular ulcer, gangrenous or bright-red in color, with elevated edges, sometimes bleeding easily upon touch, and comparatively painless. The ulcers are frequently multiple, the intervening integument being perfectly healthy; when they occur between the radial folds, they assume the elongated appearance of fissures, the folds themselves become hypertrophied, have a gray, sodden appearance, and all the parts are bathed in a thin, purulent secretion; in these sites the ulcers are not painless—in fact, without other evidence of syphilis, one could scarcely distinguish them from simple fissures.

Sometimes the anal ulcers extend upward and involve the mucous membrane, but ordinarily they heal or remain stationary and are chronic.

In the Rectum.—Above the ano-rectal line one rarely observes any secondary syphilitic manifestations other than the ulcerative. These lesions may be either single or multiple; they probably begin in an abrasion, then follows cellular infiltration, necrosis of the tissues and the formation of small crater-like ulcers with clear-cut indurated borders; they rarely extend in the early stages deeper than the submucous tissue.

Unfortunately they present few symptoms at this time, and are therefore not recognized until they have reached the chronic stage, when they are characterized by their extensive area and great destruction of tissue. The entire thickness of the wall of the gut may be destroyed and the sacrum left bare. If situated upon the anterior wall of the rectum they may even perforate the peritonæum (Mollière, *op. cit.*, p. 645).

The tendency of all syphilitic ulcers is to extend in the line of the blood-vessels and lymphatics. Thus about the anus they progress circularly and forward toward the groins, while in the rectum they travel upward. In the latter position, however, owing to their multiplicity, they sometimes coalesce and entirely surround the organ. In ulcers about

the anus, the lymphatics of the inguinal region are the first affected, while in ulcers of the rectum those in the hollow of the sacrum become enlarged. The enlargement of these latter glands must not be mistaken for gummata. If the ulceration becomes chronic and develops tertiary characteristics, as it progresses upward in the rectum, it often heals at the lower margin, leaving a bluish-white cicatrix. The walls of the rectum beneath the ulcers feel leathery and parchment-like. The discharge is greenish-yellow, purulent, tinged with blood, and very abundant. Mucus is ordinarily absent from the stools. The odor is foetid and disgusting, but distinctly different from that which characterizes the discharges from carcinoma.

The patient suffers from tenesmus, a feeling of weight and pain about the sacrum, and frequent stools. He may rest fairly well at night, but upon rising in the morning he will immediately pass a large quantity of this sanious pus from the rectum. Later in the day he may have a natural movement, but at various times throughout the twenty-four hours he will be called to the closet, only to repeat his early morning experience of passing greater or less quantities of this greenish-yellow secretion.

When the condition has existed for some time the sphincters become relaxed, the radial folds hypertrophy, and the fluid may dribble out through the anus, keeping the parts moist and irritated. From this irritation there may develop extensive ulcers about the anus. When they heal they sometimes leave a ragged condition of the anal folds resembling a cock's comb, but not so red. This condition has been considered by some as pathognomonic evidence of syphilis. Thus Sir James Paget says: "I will not venture to assert that these cutaneous growths are never found except in syphilitic disease of the rectum, but they are very common in association with it, and so rare without it that I have not seen a case in which they existed either alone or with any other disease than syphilis." While agreeing in the main with what this eminent surgeon has said, the author still believes that this condition may develop from other inflammatory conditions than the syphilitic.

The development of rectal ulceration in the early stages of syphilis is evidenced by the following brief histories:

J., thirty-two, admitted to the Workhouse Hospital, August 25, 1897. Family history clear. Had been quite well all her life, but given to dissipation. Examination showed clearly a copper-colored, macular eruption over all the body and upon the face. She admitted having had a vulvar chancre during the last week in June. This lasted about four weeks, and healed without any treatment, except keeping it clean.

Diagnosis.—Secondary syphilis. Treatment, protoiodide of mercury.

September 5th.—Patient complained of aching in her back, diarrhoea, and pains shooting down her legs. Examination showed the anus perfectly healthy, even

as high up as could be seen by forcibly separating the radial folds. Upon introducing the finger into the rectum a shallow, ulcerated spot with an indurated base about the size of a 25-cent piece was felt. The edges were not particularly elevated, and the mucous membrane around the ulcer appeared to be healthy. Through the speculum the ulcer appeared grayish-white with a crater-like base and irregular, clear-cut edges. It involved the right posterior quadrant of the rectal wall. It was superficial, bled easily, and secreted a greenish-yellow pus in abundance. The eruption was still present upon the patient's body. The sacral glands were enlarged, as were also the epitrochlear and post-cervical. The inguinal glands were not unusually engorged. The ulceration had occurred within ten weeks of the initial lesion.

The following history of another case seen in March, 1900, in the same institution, showed that the rectal ulceration coexisted with a characteristic secondary eruption, alopecia and mucous patches in the throat:

Lizzie —, aged twenty-four, a public prostitute. Family history indefinite, habits vile. Says she never had any venereal disease until six weeks previous, when she had a "breaking out on her privates."

She entered the hospital February 28th, complaining of great pain with loss of blood at each defecation, and thought she was suffering from piles. At the same time the body was covered with papular syphilides, the hair came out easily, and there were two mucous patches in her throat. Local examination showed the radial folds of the anus hypertrophied, and between them there were granulating fissures which bled easily upon touch, or when the parts were forcibly separated. There were no mucous patches around the anus, but upon introducing the finger into the rectum there was found an ulcer extending upward for about 2 inches, almost entirely surrounding the rectum, and connected below with the fissures between the folds. At the upper end the ulcer terminated abruptly in healthy mucous membrane. The base was hard and leathery, the edges elevated and indurated. It was shallow, and bled easily upon touch.

In this case, as near as can be estimated, the rectal ulcer occurred within eight weeks of the initial lesion. The third case was one seen in private practice. It was in a young man in whom the initial lesion occurred on the lip. The induration from this lesion had not disappeared at the time of the examination, although the sore had healed.

He had at the time of examination a faint copper-colored eruption upon his body. He complained of heaviness and aching about the anus, pain before a movement of the bowels, and a discharge of pus from the rectum, especially upon rising in the morning. The anus was healthy with the exception of hypertrophy in two of the radial folds. There were no fissures and no inflammatory process apparent upon the outside. The examination of the rectum showed at the height of $1\frac{1}{2}$ inches a distinct ulceration with clear-cut borders, giving to the finger that leathery, parchment-like feeling so characteristic of syphilitic lesions. The speculum confirmed the impression given to the finger. There appeared at first a profuse, yellowish-green purulent secretion; when this was wiped away an elliptical ulcer was seen about 2 centimeters long and 1 wide. It was nodular and

slightly depressed, the edges indurated, but not much elevated, and the rectal wall beneath it seemed to have lost its suppleness.

He stated that the sore on his lip first appeared eleven weeks before consulting me.

In this case the ulceration occurred within twelve weeks after the initial lesion.

Numerous cases could be cited in which the ulcerations have occurred within two, three, or four months after inoculation, but these appear to be sufficient to establish the fact that they do occur in the early secondary stages of syphilis. The first two cases left the institution much improved but not well, and it is impossible to say what was the final result in them. In the last case the patient was observed for over two years, and there was never the slightest evidence of any stricture of the rectum, showing that, if these ulcers are treated in their early stages, this disastrous complication may be avoided.

The fact that one can not obtain the history of initial lesions, previous secondary symptoms, or present manifestations of the specific disease, ought not to deter him from making a diagnosis in cases of characteristic syphilitic ulceration of the rectum, such as the following:

Mrs. S. came to the Polyclinic Hospital, October 15, 1895, suffering from a profuse rectal discharge which she said had existed for two months. There was nothing in her appearance to suggest syphilis. Her husband had died from tuberculosis one year previous. She denied ever having suffered from any skin eruption or any local ulceration. Her skin was clear, and there was no marked engorgement of the lymphatic glands. The anus was normal with the exception of hypertrophied radial folds. There were no ulcers between these folds. The sphincter was relaxed so that purulent discharges from the rectum constantly oozed out, necessitating the wearing of a napkin. Examination of the rectum showed extensive destruction of mucous membrane of this organ as high as 4 inches above the anal margin, and surrounding the entire gut. The walls were stiff, inelastic, and nodular, and bled easily upon touch. The rectal ampulla was constantly ballooned, but there was no contraction of the caliber of the gut at this time. Around the lower margins of the ulceration there were distinct evidences of the healing processes in the existence of bluish-white, depressed cicatrices.

The discharge was a yellowish-green pus tinged with blood, and very abundant. At first tuberculosis was suspected in this patient, but careful examination, day after day, failed to show any tubercle bacilli. Finally, after three months, the patient consented to take ether, and a small section of the ulcerated mucous membrane was removed for examination.

Histological report by William Vissman, M. D.:

"This specimen shows the epithelium of the mucous membrane entirely destroyed. The Lieberkühn follicles are largely obliterated, there being a few small depressions, which appear like the lower end of such follicles lined with columnar epithelium. There is an intense cellular infiltration of the submucous tissues dipping down into the muscular layers, and presenting the appearance of new-formed fibrous cells.

"The blood-vessels show distinct endarteritis. Embryonic cells are distributed along the whole course of these vessels, and at no place are there any giant-cells or tubercle bacilli, nor are there any accumulations of epithelium which would indicate carcinoma. On the whole, one would describe this condition as productive inflammation with fibrous and cellular infiltration. This is a condition frequently found in chronic syphilitic inflammations."

Antisymphilitic treatment was begun at once, but too late, for the patient shortly afterward developed a papillo-squamous eruption all over her body, on the palms of her hands, and on the soles of her feet; engorgement of the cervical glands was not found in this patient. Either the woman concealed the true history of her case, or it consisted in a latent form of syphilitic infection, which first exhibited itself in the rectal ulceration, and afterward in the cutaneous eruption. Notwithstanding the most vigorous antisymphilitic treatment, the use of local remedies and constant dilatation, it was not possible to prevent contraction in her rectum; and to-day, after seven years, she still has some ulceration, and finds it necessary to pass the rectal sound twice a week in order to keep the passage open.

The author had under his charge in the Polyclinic Hospital in 1901 a case with exactly similar conditions in the rectum. Her ulcerations developed about nine months after the initial lesion, and have now continued for two years. When the ulceration has reached the destructive stage general and local treatment may finally heal the ulcers, but they can not prevent the formation of stricture. The prognosis is therefore always grave.

Treatment.—The treatment of these secondary types of syphilitic inflammation of the rectum consists in the administration of mercury and keeping the parts clean, thus avoiding as far as possible any secondary infection by streptococcus or other pyogenic bacteria. Like many of the cutaneous lesions of syphilis, the secondary manifestations of syphilis in the rectum will sometimes disappear without constitutional treatment under proper antiseptic care of the parts, but medication should not be neglected. A large number of destructive ulcerations and incurable strictures of the rectum, called syphilitic, are not due so much to the syphilitic virus as to the septic infections occurring through the lesions; because of this more stress is laid upon the local treatment of these conditions than upon the constitutional. This secondary infection explains also the statement so often made by syphilographers and proctologists that mercury and iodide of potash have little or no effect upon syphilitic ulcerations of the rectum.

A mixed condition, specific and septic, must be dealt with, and therefore treatment should be directed in two lines. Complete drainage, even if the sphincter muscles must be dilated or incised, is requisite to heal

these ulcers, and frequent washings and dressings are important in order that the parts may be kept free from septic bacteria. To accomplish this the patient should be confined to bed, if possible in a sanitarium or hospital, where these directions can be systematically carried out.

After the ulcers have been thoroughly washed and freed from the secretions, they should be dusted over with some drying antiseptic powder, as antinosin, iodoform, aristol, calomel, or boric acid. When calomel is used, it is well to wash the parts off with lime-water afterward, as it will remove the particles more effectually than any other fluid, and is at the same time a good antiseptic. Stimulation of the ulcerations by the use of nitrate of silver, sulphate of copper, or other agents may sometimes be necessary. The tubular speculum and the knee-chest posture enable one to insufflate powders upon all parts of the rectum or to spray them with various medications. The bowels should be regulated to move once a day if possible; the administration of a certain amount of opium to control the tendency to diarrhoea is often advisable.

The constitutional treatment in these conditions is similar to that of secondary syphilis in any other portion of the body. It consists in the administration of mercury in as large doses as the patient will bear. In rectal syphilis the drug should be given by inunctions, baths, or hypodermically, as the internal administration is likely to aggravate the tendency to diarrhoea, and should therefore be avoided. Iodide of potash in this stage of the disease is advised by most syphilographers, though its efficacy is questionable. Mercury is probably the only drug which has any direct effect upon the specific virus; the iodide acts by hastening the absorption of the inflammatory deposits, but probably does not affect the virus itself. Inasmuch, therefore, as these patients usually suffer from digestive disturbances, it is best to refrain from using this or any other medication by the stomach, except such as are directed toward the improvement of functional action in the digestive organs.

Tertiary Lesions.—The chief characteristics of tertiary lesions in the rectum are as follows:

a. They develop in no regular order with relation to the initial lesion; they may come on immediately after the secondary eruption, or months, even years later; indeed, they may never come at all.

According to the statistics given by Morrow (*op. cit.*, vol. ii, p. 139), they only occur in about 10 per cent of the cases of constitutional syphilis. Of this number, about 25 per cent occur in the skin and the rest in the nerves, bones, and special organs of the body.

b. Another characteristic is that they are likely to be recurrent. They pass away or are dissipated by the action of medicines, and at long periods thereafter reappear again.

c. They are localized, involve the deeper tissues, are destructive, and leave cicatrices on healing.

d. They do not yield readily to mercury.

e. They are only mildly contagious, and are nearly always auto-inoculable, showing that the ulcers are mixed infections.

The chief types of these affections are gummata, destructive ulceration, ano-rectal syphiloma, and proliferating proctitis.

Gummata.—Gummata may occur in any portion of the body in which there is connective tissue. At the anus they are exceedingly rare, while in the rectum they are somewhat more frequent, thus reversing the order of primary and secondary lesions. Fournier states that he has never observed a gumma of the anus except in an extension of gummatus ulcerations occurring in the neighborhood, and in cases of ano-rectal syphiloma. Mollière (p. 641) describes a gumma occurring primarily at the anus. Verneuil (*Gazette des hôpitaux*, 1888, p. 202) has reported a most interesting case of this kind in which the gumma appeared as an induration at the margin of the anus, about the size of a small orange, and extending across the ischio-rectal fossa; it was smooth, elastic, and painless to the touch, and, believing that the tumor contained pus, he incised it with a bistoury, but obtained nothing beyond a discharge of blood. Some days afterward suppuration took place, and a fistula resulted, for which an operation was done. The ulceration and induration having persisted, he placed the patient upon antisyphilitic treatment, and obtained a complete cure after a limited time. This case is in line with several that the author has seen, and reported under the head of fistulæ, inasmuch as he had not seen them in the gummatus stage. There were induration and ulceration of the wounds without any tendency toward healing until antispecific treatment was begun, after which it progressed promptly enough. A number of times nodular deposits beneath the radial folds of the anus have been seen in cases of tertiary ulceration of the rectum, which may have been gummata, inasmuch as they disappeared under the influence of local treatment to the ulcers and constitutional treatment for the disease; they were not recognized as such, however, and seemed to be simply inflammatory deposits. Taylor (*Journal of Cutaneous and Genito-Urinary Diseases*, 1886, p. 226) records a case in which the gumma was situated in the recto-genital septum.

Gummata within the rectum have been reported by Bumstead and Taylor (*Venereal Diseases*, p. 607), Ball (*op. cit.*, 225), Zappala (*Archiv f. Dermat. und Syphilog.*, Prague, 1871, p. 62), Poelchen (*Archiv für Path. und Physiolog.*, Berlin, 1892, p. 27), and Keuster (*ibid.*, p. 275). In one case, from which the drawing was made (Fig. 99), the patient had suffered from syphilis five years previously. She had been treated at the

time, and had noticed no manifestations during the three years preceding the time of examination." She complained of pain at defecation, bearing down, and the feeling as if some foreign body was in the rectum. Examination showed a dry, brittle condition of the anal mucous membrane, with some hæmorrhoids, and a smooth, globular swelling about 1 inch above the margin of the anus, freely movable both upon the muscular

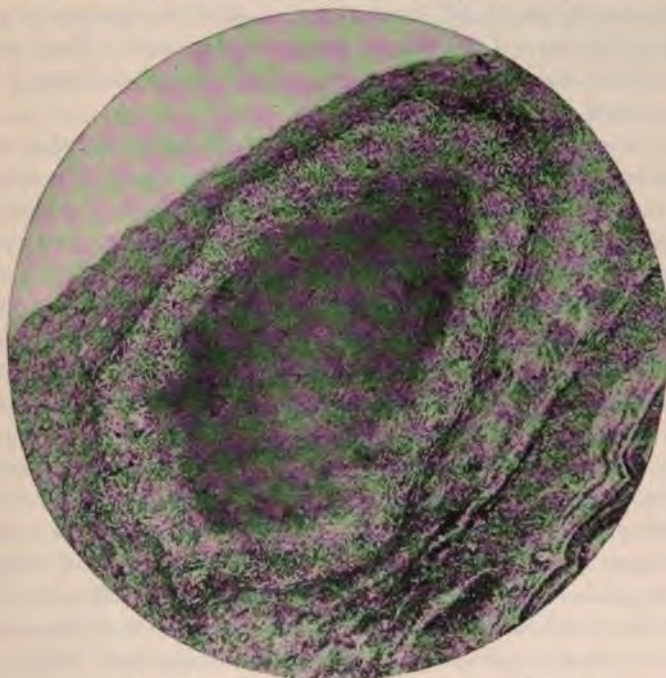


FIG. 99.—PHOTOMICROGRAPH OF GUMMA OF THE RECTUM.

and mucous walls of the gut. An operation was performed to overcome the fissures, the hæmorrhoids were removed, and the little nodular swelling was dissected out.

The pathologist's report described the growth as typical gummatous material, with granulation tissue in all stages of development. The patient was at once put upon antisyphilitic treatment, and the operative wounds all healed without any complication.

In the case of Zappula there were found in the lower portion of the rectum some globular, smooth, elastic masses; at a distance of about 4 centimeters ($1\frac{1}{2}$ inch) above the anus there was a similar mass about the size of a small hazelnut, and painless to the touch; there was no ulceration and no cachexia. The diagnosis was properly made, and the tumors disappeared under the administration of iodide of potash. He states that symptoms of absolute obstruction occurred in this patient,

but it is difficult to understand how a tumor of this size in the rectum could possibly occasion it; evidently there must have been other and larger gummata above, or the symptoms were due to some other cause. Mollière reported a case, somewhat similar to this, in which the gumma was of a much larger size. When occurring in the rectum these tumors appear as *round, elastic, and painless deposits in the submucous tissues, and in their early stages are not attached to either the mucous or muscular wall of the gut.* Later on they may involve both. They are generally localized, may be single or multiple, and of any size from a hempseed to a small orange (Poelchen's Path., p. 51).

There is no marked inflammatory zone about them, and they are not accompanied with any contractile fibrous bands in their early stages, although there may be a slight deposit of fibrous tissue in the neighbourhood of the growth. They do not suppurate, but undergo a sort of fatty degeneration according to Mollière, and thus break down. The facts that *they do not produce abscesses, are not painful, and do not occur in chains distinguish them from engorged lymphatics.* When they break down infection takes place, causing inflammation and an increase in the inflammatory deposit. The condition thus resolves itself into an ulcer, which, healing, leaves a contracting cicatrix that may cause stricture of the rectum. Temporary stricture of slight degree may result from gummatous infiltration and fibrous deposit around it, but these strictures do not become permanent unless there is some destruction of tissue by necrotic or ulcerative processes. All the reported cases in which gummata of the rectum have been recognized and treated without the occurrence of ulceration, have recovered without leaving strictures. Thus one may refer to the cases of Zappula, Taylor, Fournier and Gant, in which all the syphilitic manifestations disappeared under general treatment and left no contracture.

When gummata disintegrate, the destruction of tissue may be extensive, sometimes even perforating the wall of the gut; if this occurs upon the anterior wall in females, it may result in recto-vaginal fistula.

Taylor states that involvement of the rectum may be secondary to an "indurated œdema" following infiltration and ulceration of the vulva or anus early or late in the disease; that ulceration from such conditions resembles the chancroidal, and that it has a tendency to the production of rings of connective tissue about the rectum. He says that these rings are not gummatous in their nature, and the induration and swelling occasioned by them should not be mistaken for this form of the disease. In other words, they are simple inflammatory products and not syphilitic. The importance of this statement will be appreciated when we come to the study of stricture of the rectum, and learn that *many strictures in syphilitics are not syphilitic.*

Tertiary Ulcerations.—One of the most frequent manifestations of tertiary syphilis is a dry, brittle condition of the muco-cutaneous tissue about the anus resembling that seen in atrophic catarrh. Forceful separation of the buttocks or stretching of the anal canal in these cases will produce little buttonhole-like slits in the membrane, which bleed and itch, but do not cause actual pain. The passage of a hard stool or the introduction of a bougie will cause these rents. They are sometimes points of infection, and ulcerations result which combine both specific and septic characteristics. The process extends upward between the radial folds, and may involve the mucous membrane of the rectum to an indefinite height; the ulcers may become phagedenic and result in great destruction of tissue, as in the case of Lane (*Lancet*, London, 1891, vol. i, p. 486), where almost the entire perinæum, together with the anal and vaginal orifices, were destroyed, notwithstanding antisyphilitic medication.

Tertiary ulcerations also result from traumatism, disintegrating gummata, and from necrosis of tissue due to occlusion of the arterial supply by endarteritis.

The anus and rectum are subject to frequent traumatisms from hard stools, foreign bodies, etc.; in women they are often injured during coitus, pregnancy, and childbirth; all such injuries may take on a specific nature in syphilitics. That they do not yield to mercury and iodides is due to their constant irritation and infection by the fecal passages. Such ulcers lose their specific characteristics under specific treatment, and histological examination then reveals only a chronic inflammatory condition; those due to gummata and endarteritis usually maintain their specific characteristics until they are healed, because the process is more deeply seated and requires a longer time for eradication.

Tertiary ulcers occur most frequently just within the rectum; they are deeper than the secondary ulcers, are crater-shaped, have yellow indurated bases, sharply defined borders, and are rarely ever undermined. Surrounding and beneath them the rectal wall is thickened, stiff, and inelastic, which condition, when it involves any considerable portion of the circumference, sooner or later results in stricture.

Infection is an important element in their tardy healing, and may have much to do with the fibrous deposit that causes the contracture. This, together with systemic conditions, such as diabetes, Bright's disease, and tuberculosis, is accountable for those widely destructive phagedenic conditions, many of which have been collected and reported by Hahn (*Arch. f. klin. Chir.*, Berlin, 1883, p. 395). In one case, seen some years since, the entire anus and sphincters were destroyed, the membranous urethra was left bare, and the mucous membrane of the

rectum entirely obliterated to the height of over 6 inches. Notwithstanding there was a distinct history of syphilis in this case, microscopic examination of the specimen removed showed only chronic inflammation, with here and there slight endarteritis. These ulcers not infrequently perforate the rectal wall and result in fistulas of various types, which do not differ from simple fistulas except in tardiness of healing.

The suppuration in extensive ulcerations of this type is sometimes enormous. Hahn has reported a case in which it amounted to a liter per day, and recently in the Polyclinic Hospital a case was treated in which it was almost as much. The odor is not characteristic as in cancer.

Ano-rectal Syphiloma of Fournier.—Fournier (*Lésions tertiaires de l'anus et rectum*, Paris, 1875) describes under the above heading a specific fibrous infiltration of the rectal walls: They are thickened, mammillated, and rigid in feeling, without any ulceration. He states that it is essentially a hyperplastic proctitis tending to sclerotic change, as is seen in the kidneys, liver, and other organs in late syphilis. It begins in the submucous tissue, and, according to him, when ulceration occurs it is the result of the process and not a part of it. He says (*France médicale*, October 31, 1874) that "the essential redoubtable phenomena upon which depends all the evolution of this pathological process is a tendency to contract. This contracture is, by virtue of its fibrous tissues, comparable in this to inodular tissue, that it retracts without cessation upon itself." Fournier states that the disease is always due to acquired syphilis, but Ball mentions a case in a boy ten years of age suffering from congenital syphilis. Van Harlingen (*International Encyclopædia of Surgery*, vol. ii, p. 519) claims that the disease rarely extends beyond $2\frac{1}{2}$ inches from the anus. This limitation, however, is not corroborated by other observers. Maclaren (*Edinburgh Clin. and Path. Jour.*, 1883-'84, p. 875) considers this a form of infiltrating gumma. His microscopic reports, however, disprove this, for he says: "The tumors were composed of dense, fibrous tissue sparingly supplied with blood-vessels," a condition not seen in gummata.

The majority of syphilographers have adopted the theory of Fournier, and the weight of authority is therefore in its favor. They state that in the early stages it produces no symptoms such as pain, discomfort, or obstruction to the movement of the bowels; that the only method of diagnosing such conditions would be by early digital examination, which would show a thickened, infiltrated, inelastic condition of the rectal wall containing more or less nodular masses extending for several inches upward from the anus; that this condition proceeds until constipation from gradual contraction of the rectum results, and the

mucous membrane breaks down, owing to friction, abrasion, infection, or some interference with its circulation. According to this theory the stricture occurs first, and the ulcerations which follow it are produced by other causes than the actual specific disease. There is no authenticated report of the careful observation of such a course of events in a single instance, and it appears to the author, therefore, as purely theoretical.

The experiences and opinions of others upon this condition of the rectum, so ably described and defended by Fournier, are given here, though in many years' experience in rectal examinations the author has never observed a single typical case of this ano-rectal syphiloma. He has observed a number of cases in which the patient had suffered from syphilitic proctitis and ulceration in the secondary stages of the disease, which ulcerations had healed, the patients had thought themselves cured, and discontinued treatment, but afterward found that the disease had returned in the form of fibrous infiltration and stricture of the rectum. In every one of them there were characteristic bluish-white cicatrices, and the patients gave a history of having suffered from irritation of the rectum and a discharge of mucus or pus at some previous time. The condition which Fournier described exists, but it is associated with a history or evidence of a previous rectal ulceration. Fournier alone positively and unequivocally claims to have observed this condition from the beginning, and even his reports do not eliminate the possibility of previous ulceration. Quénu and Hartmann, in their excellent work, cite only one example of this condition, and this they say was preceded by syphilitic ulceration of both the rectum and anus (*op. cit.*, vol. i, p. 92). It seems, therefore, that the condition originates in specific ulceration, which becomes infected, and thus sets up a proctitis with fibrous infiltration. In proof of this we may cite the fact that mercury and iodides have no effect upon it, as they would do if the infiltrate were syphilitic in its nature.

Proliferating Proctitis.—Under the title *Rectitis Proliferante Syphilitique*, Paul Hamonic (*Annal. méd. chir. trans., France et étrang.*, 1886, vol. ii, p. 3) has described a condition which he considers a peculiar syphilide. The disease consists in a growth characterized by fragile villous prolongations, of feeble resistance, from the mucous membrane of the rectum. In the cases cited the tumors filled up the rectum, and yet, according to Hamonic, they did not tend to form a stricture. Kelsey (*op. cit.*, p. 335) has detailed a case, which may be of this same character, under the title of syphilitic ulceration of the rectum. The author has also reported a case of this nature, but in which true obstruction of the rectum took place. Here there was a specific fibrous stricture underlying the hypertrophic granulations or villous

condition. Such a state of affairs may be brought about by irritating discharges from specific or non-specific ulcerations.

In the author's case the history of long-standing ulceration was clear. The condition entirely disappeared under antiseptic and antisiphilitic treatment after colostomy, but left only a narrow fibrous canal where the rectum had been.

The pathological examination of all these ulcerated types of syphilis of the rectum shows a consistent sequence of events; first, the destruction of the cylindrical epithelium of the mucous membrane, which may afterward be replaced by a corneous or pavement epithelium covering a cicatrix (Hartmann); second, a cellular infiltration by embryonic elements sometimes containing yellowish nodules of a gummatous type, almost surrounded by a fibrous or sclerotic zone. In the early stages the blood-vessels are multiplied and dilated; in the later stages they are decreased, contracted, and always present evidences of endarteritis. It is simply a question of the age of the process, whether the cells are young and feeble or whether they are old and surrounded by strong zones of sclerotic tissue, as to whether it can be resolved or not.

Syphilitic Stricture of the Rectum.—Enough has been said above to indicate my belief that unadulterated syphilitic strictures of the rectum are very rare. There is not an authentic case on record in which careful, systematic examinations throughout the early stages of the disease have failed to show ulceration of the rectum at some time previous to the stricture. Any solution of continuity in the mucous membrane of the rectum forms an open doorway for septic infection and consequent inflammation.

While we know that a large number of strictures of this organ occur in people in whom there is a more or less distinct history of constitutional syphilis, yet we must bear in mind the fact that because a patient once had syphilis will not account for all his pathological accidents in after life. He may have a stricture of the urethra, the rectum, or œsophagus, that is not syphilitic in its nature, and upon which antisiphilitic medication will not have the least effect. Those who claim that this condition is due to a primary infiltration of the rectal walls by syphilitic material fail to fortify their opinions by a record of careful preliminary examinations. Have they ever examined the rectum of one of these cases throughout the course of his disease a month or a year before they found the stricture? All admit the process of stricture formation by ulceration, but try to explain away the complicating effects of infection by abstruse theories of syphilitic cellular infiltration of the rectal wall.

The first stage of these strictures consists in an ulceration, traumatic or otherwise, of the mucous membrane. This is followed by the

deposit of a soft embryonic tissue in the submucous wall of the gut, together with infection by colon bacilli or other germs. This infiltration and infection penetrate downward into the muscular wall. The mucous membrane may reform over this area, producing a soft cicatrix, over which the epithelium, changed to a stratified type, is established, and presents a bluish-white appearance. This cellular infiltration having once penetrated the muscular wall of the gut, finds a channel of least resistance between the circular fibers, and thus gradually infiltrates the whole circumference. The profound infiltration has a much greater tendency to surround the gut than has the superficial, because in the superficial and submucous layers it follows the course of the blood-vessels. Thus we sometimes find a limited ulceration upon the wall of the intestine with an extensive, deep infiltration almost surrounding the gut. In the early stages of this infiltration these tissues are soft and dilatable. They also yield comparatively good results to the administration of antisyphilitic medication and dilatation, but if organization of fibrous tissue has taken place, if the muscular fibres have become atrophied or transformed into fibrous tissue, medication and dilatation are no longer permanently effectual. One may give mercury and iodide and stretch the parts to the highest limit, but they will recontract.

The comparison made by Monot between rectal stricture or ano-rectal syphiloma and syphilitic testicle is not at all logical, because we have to deal in one case with a true glandular organ, and in the other with a muscular and mucous membrane. Injury to the mucous membrane, infection, ulceration, and inflammatory deposit are the steps in the production of every stricture, and in the syphilitic this inflammation takes on the character of the constitutional disease—viz., gummatous deposits and endarteritis.

For the pathology and further consideration of syphilitic stricture the reader is referred to the chapter on Strictures of the Rectum.

Treatment.—The treatment of tertiary syphilis of the anus and rectum differs from that of the disease elsewhere in the body only in the management of the local conditions. It consists in the administration of the iodides in as full doses as the patient can bear, inunctions or hypodermic injections of mercury, and the topical treatment of local conditions. As many of these patients suffer from digestive disturbances, it is frequently found that the iodide of potash aggravates these conditions; it should be administered in milk, the essence of pepsin, or the elixir of lactopeptine. Giving it in moderate doses and frequently will often accomplish better results than a few large doses given in water, and at the same time the patient is being nourished; when milk is not acceptable to the individual, the iodide can be dissolved in

it and then converted into whey by the addition of a little rennet. The fluid portion of this whey contains practically all of the iodide, and is generally well borne by the stomach. The iodide of potash may be alternated with the iodides of sodium, lithium, and strontium; the amount which may be administered in a day is very variable: some patients stand exceedingly large doses, while others can take only moderate quantities; in general, one is able to obtain as good results from 60 to 100 grains of the drug per day as from the enormous doses recommended in certain special works.

As to the mercuric inunctions, the methods of carrying this out are described in all books upon therapeutics and genito-urinary diseases. Very good results may be obtained by enclosing 3 or 4 drachms of mercuric ointment in a flannel amulet, which is fastened around the patient's neck by a band, thus allowing it to hang about the middle of his chest or between his shoulder-blades; this is much more cleanly than the ordinary inunctions, and seems to accomplish as good results. For hypodermic administration bichloride of mercury has proved most satisfactory, but salicylate of mercury seems to be very effectual.

The local treatment of the different manifestations is practically the same as that described for secondary syphilis. Rest in bed, functional rest to the parts by the proper regulation of the bowels, antiseptic irrigations or washings, and occasionally stimulation by mild cauterizing agents in the sluggish, ulcerative conditions, are the general lines upon which this should be conducted. When there is extensive ulceration and profuse purulent discharge from the rectum, drainage of the parts should be established by dilatation of the sphincters, and if necessary the introduction of two small drainage-tubes in order to prevent the accumulation of these septic discharges in the ampulla. With the two tubes in place one may irrigate the parts frequently without disturbing the patient very much. Solutions of benzo-naphthol, boric acid, β -naphthol, bichloride of mercury, and chloride or bicarbonate of sodium are all useful for this purpose.

The dilatation of the sphincter should be gently and carefully made so as to produce as little traumatism as possible. The swollen hypertrophied folds around the margin of the anus should ordinarily be left alone, as they will largely disappear after the inflammatory process has subsided. Condylomata developing around the anus may be treated by cutting them off with scissors, cauterizing them with the actual cautery, or, better still, by the application of monochloroacetic acid, followed by some drying powder, such as has been mentioned before. After the ulcerations have begun to heal, the rectal dilator or a large-sized bougie should be used every two or three days to prevent contraction.

In those severe types in which the mucous membrane of the rectum

PLATE III.



MUCOUS PATCH ON
HOUSTON FOLD



SYPHILITIC STRICTURE
(SEEN THROUGH PROCTOSCOPE)



HEREDITARY SYPHILITIC FISSURE

SYPHILITIC AFFECTIONS OF THE RECTUM

is practically destroyed, the utmost patience and perseverance will have to be exercised by both doctor and patient; months and years of treatment are necessary to heal such conditions.

There is no doubt that healing may be hastened by absolute rest through the production of an artificial anus, a proceeding that may be justified in these cases, although very few patients will submit to it. It has been carried out by Hartmann, Hahn, and several other surgeons, and the author has treated three cases in this manner, all of which healed finally but not rapidly. In two of them there was permanent stricture left, which rendered it inadvisable to close the artificial anus; in the other the ulceration healed in about three months, and the colostomy was repaired shortly thereafter; but the rectum never assumed its normal, smooth, elastic condition. In one of the first two cases an artificial anus had been made and closed by another surgeon previous to my seeing her, and the ulceration and stricture of the rectum had recurred after the closure; so it was best to make a permanent artificial anus after Bailey's method in her case. Such experiences lead to the conclusion that, while these ulcerations heal more rapidly by giving the parts absolute functional rest, at the same time one should be very guarded in prognosis, for healing even under these circumstances is slow, and the condition is likely to recur after the normal channel is reestablished.

The treatment of stricture will be considered in the chapter upon that subject, and the methods of making artificial ani can be found in the chapter on Colotomy.

Hereditary or Congenital Syphilis of the Anus and Rectum.—Lesions of the anus are among the earliest manifestations of hereditary syphilis. They may occur at any time after birth up to several years of age, but the most frequent period at which they are observed is during the first three months. In the large number of hereditary syphilitics which pass through the eleemosynary institutions these manifestations about the anus are unrecognized, or considered simple irritative lesions due to lack of cleanliness and proper diapers. It is not until the later manifestations of hereditary syphilis appear that a true diagnosis is made in the majority of cases. However, there are instances in which late secondary cutaneous and osseous lesions have occurred in infants in whom early examination had failed to disclose any rectal or anal affections. On the other hand, over 50 per cent of the children born from syphilitic parents have manifested the disease within the first six months through lesions about the anus. Besides those cases in which the parents were known to be syphilitic, the author observed in his clinic for diseases of children at the Northern Dispensary of New York, a number of cases of hereditary anal syphilis in infants whose mothers were free from any

external manifestations of, and denied having suffered from, the disease; this would indicate, of course, infection from the father.

The disease first appears in children as a sort of erythema or dermatitis around the anal region, which may occur within the first few days of life, or it may be delayed for several months. Elsewhere a case was reported in which the author observed this erythema at the age of three days (Morrow's System of Genito-Urinary and Cutaneous Diseases, vol. ii, p. 436); since that time he has seen a child apparently born with it, as the condition was present twenty-four hours after birth. The parents of this child were both syphilitics.

The erythema is often accompanied by a fragile condition of the mucous membrane and shallow fissures between the folds of the anus. If these fissures are not present, they may be produced by the forcible separation of the buttocks. The condition is very easily confounded with that irritated condition called chafing, which is produced by contact with the urine and faecal materials; the brittle condition of the mucous membrane, however, and the numerous small fissures between the radial folds will serve to distinguish these two conditions.

In the early stages the skin is slightly pigmented, red, or copper-colored in a zone extending about 1 or 2 centimeters around the anus; but after a few days the skin becomes somewhat thickened and elevated, and thin, sero-purulent discharges are set up, which soon assume a foetid odor. The little dry fissures do not extend beyond the margin of the sphincter in this early stage, but if the condition is not treated they may penetrate the anal canal itself, become infected, and develop into progressive ulceration of the anus and rectum. This ulceration may occur within the first three or four months of life. Little fissures may be complicated by hypertrophy of the radial folds. When they have existed for a considerable period without treatment they take on the characteristics of true fissure—i. e., they cause pain, burning, and constipation due to fear of going to stool on account of suffering. A marked instance of this was recently observed at the clinic.

A child fifteen months old suffered from constipation and little inflamed tabs about the margin of the anus. It had typical pigmentation and induration of the tissues about the orifice. The mucous membrane cracked easily at various points upon forcible separation of the buttocks, the inguinal lymphatics were enlarged, and in the posterior wall of the rectum, about 3 inches above the anus, there was a smooth, round, elastic deposit, over which the mucous membrane moved easily, and which itself could be moved upon the muscular wall. There were no other enlargements above or below it, which would have been the case in all probability if this was a lymphatic engorgement. It is needless to say that this growth was a true gumma. There was a distinct painful

fissure and sentinel pile, which the illustration shows (Plate III, Fig. 3). If the diagnosis of these erythematous irritations about the anus be in doubt, and if the history of the case does not justify one to assume syphilis to be the etiological factor in their production, he may wait for the development of other symptoms to corroborate his opinion. Ordinarily these symptoms are not slow to appear. The lack of normal development in the patient, the appearances of the squamous lesions upon the soles of the feet and in the palms of the hands, the dry, rigid condition of the flexures of the joints, Hutchinson's teeth, and frequently the development of other cutaneous manifestations, will lead to a positive diagnosis. It is a question, however, whether in such cases one had better not adopt the principle of Wood, and, admitting that there is a possibility of hereditary syphilis in every child, treat it upon that principle, and give the innocent babe the benefit of a doubt. Delay is sometimes disastrous; whereas in most of the cases in which the condition is recognized immediately after birth, and treated actively, the disease can be mastered, and a comparatively healthy child developed. From the first to the fourth year late manifestations of syphilis develop in hereditary cases. The little patient described above suffered (so his mother said) with redness and chafing about the anus since he was born, though there had never been any other skin lesions, and the child seemed to be fairly nourished. He had typical Hutchinson teeth and general glandular enlargements. Aside from this and the anal manifestations, there was no other evidence of syphilis. The mother stated that the father had suffered from breaking out on the body and sore throat at various times.

In 1893 a child two years of age, who had suffered from shortly after birth with inflammation about the rectum, was brought to the clinic. This child not only had induration, thickening, and pigmentation about the anus, but also ulcerative lesions about the folds of the nates. There was an inelastic, leathery condition of the rectal wall, and three well-marked gummata in the organ. There were also crescentic patches of papular syphilides at several points upon the body. The father denied venereal taint, but at the very time had a tertiary eruption upon his body, and was suffering from a small syphilitic ulcer in the rectum, which he supposed was an inflamed hæmorrhoid. I have followed these cases up to within the past year. The father is apparently perfectly well. The child has grown to be a healthy maiden; the induration and thickening of the rectum have entirely disappeared, and one could not recognize the fact of her ever having had the disease.

Ball (*op. cit.*, p. 184) reports a case in a child ten years of age in which there appeared to be the condition known as ano-rectal syphiloma. In the chapter on Congenital Malformations reference was made to

syphilis as an etiological factor in the production of congenital strictures of the anus. Bodenhamer (*op. cit.*, p. 63) looks upon this as an established fact.

Notwithstanding the majority of manifestations of syphilis in children are hereditary, one ought always to bear in mind the possibility of its being acquired. Quénu and Hartmann give an interesting case of this kind, in which a child of two years of age passed through a typical sequence of early and late secondary syphilis, followed by well-developed tertiary symptoms. The father of this child is said to have contracted syphilis after the child's birth, the mother was free from the disease, and therefore by inference the authors concluded that it was a case of acquired primary syphilis, and not hereditary disease. Bearing upon this same subject, we also refer once more to the remarkable statistics of Duhring, of Constantinople, who states that out of 31 chancres of the anus and rectum, 26 were in children, all of which must have been acquired and not hereditary. Whether these infections were due to accidents or unnatural vice the author fails to state.

Syphilitic ulcerations of the anus and rectum in children do not usually involve any extensive area, nor are they accompanied with any great destruction of tissue; the process seems to limit itself to the cutaneous, mucous, and the immediate underlying tissues.

Treatment.—The constitutional treatment of hereditary syphilitic manifestations about the anus differs in no wise from that of hereditary syphilis in other portions of the body.

Mercuric inunctions either through the stomach bandage, by rubbing, or through the wearing of the amulet-like bag containing mercuric ointment, are all good, and should be persisted in for long periods. Iodide of potassium or other salts in small doses, together with tonics, especially hypophosphites and cod-liver oil, should also be used.

As to the local conditions themselves, applications such as have been mentioned for the treatment of these conditions in adults, only in milder proportions, should be adopted. Equal parts of glycerin and cod-liver oil have been found to be an excellent remedy in these children, in that it is not only a nourishment and a tonic, but it also keeps the fæcal movements soft and regular.

Prognosis.—The prognosis in these cases is variable. Just in proportion to the early recognition and radical treatment adopted will it be good or bad. The majority of cases, if seen and treated during the first two or three months, will escape all later manifestations of the disease. In some children, however, the general vitality is so feeble, even at the time of birth, that no treatment, specific, tonic, or otherwise, succeeds in establishing good health. Especially is this the case

in foundling asylums and eleemosynary institutions, where the lack of proper food and general hygienic surroundings make the conditions unfavorable.

In the better walks of life, where every need can be met, and every luxury afforded, these children generally escape the manifestations of the disease, owing largely to the fact that the intelligence and general knowledge of their parents upon these subjects lead them to an early recognition of their responsibilities in the case, and the admission of the facts, so that no time is lost.

In the lower walks of life ignorance, carelessness, and lack of cleanliness all contribute to negligence and late recognition of the child's condition; hence the prognosis in this class is unfavorable.

CHAPTER VIII

NON-SPECIFIC ULCERATIONS

THE term non-specific is employed here simply to distinguish the various types of ulceration from the venereal and tubercular varieties. Many of them may be due to just as specific bacilli, but so far these have not been isolated and specialized. The general plan already outlined will be followed, and the subject will be divided into:

Ulcerations of the Perianal Region.

Ulcerations of the Anal Canal.

Ulcerations of the Rectum and Sigmoid.

ULCERATIONS OF THE PERIANAL REGION

Ulcerations at the margin of the anus and of the cutaneous tissue surrounding it are not limited to any age, sex, or environment; they are more frequently found in those in the lower walks of life where attention to hygiene and cleanliness is not much observed. They are due to traumatism followed by infection, irritating discharges from the anal and rectal canals, gonorrhœa, chaneroid, chancre, syphilis, herpes, ringworm, tuberculosis, and carcinoma.

Traumatic Ulceration.—Traumatic ulcerations of the perianal region differ from cutaneous ulcerations elsewhere in the body only inasmuch as they are influenced by the anatomical relations of the parts. While the skin upon the buttocks is tough and thick and the epithelium horny and dry, that around the margin of the anus becomes thinner and thinner as it approaches the muco-cutaneous surface. In it are embedded sebaceous and hair follicles, together with many sudoriferous glands and an increase of pigment. In the mouths of these little follicles and glands the bacteria and bacilli which normally inhabit the intestinal canal, and are consequently brushed over this area by the fecal passages, find a habitat and are always present. Any traumatism or abrasion of the parts therefore becomes easily infected and an ulceration results, the progress and extent of which will depend upon the care given to the lesion, the vital resistance, and general constitutional con-

dition of the invalid. When extreme cleanliness is observed, antiseptics are used, and the parts are protected from constant friction, they generally heal kindly in individuals otherwise healthy; under other conditions the infection becomes progressive and they may extend over large areas.

When the ulcer originates in a superficial lesion and affects the surface of the skin only, it will ordinarily limit itself to these tissues; but those due to furuncles or perianal abscesses may extend to indefinite depths.

Simple ulcerations are due to infection by various pyogenic germs, including staphylococcus, pyogenes albus or colon bacillus. They may be single or multiple. Their shape is very irregular; the edges are red but not much inflamed, and gradually slope down to the base, which is crater-shaped, highly granular, sometimes furrowed, and bathed in a purulent discharge.

There are no constitutional symptoms, and the lymphatics are rarely involved. Wiping or cleansing the parts causes a bloody oozing. The act of defecation may be somewhat uncomfortable, but does not occasion acute pain; sometimes a slight bleeding follows it owing to the abrasion of the surface, but there is never anything like a hæmorrhage. Pruritus is often a very annoying symptom.

Little abscesses may develop in the deeper layers of the skin owing to infection of the sebaceous or hair follicles, but they rarely penetrate the subcutaneous cellular tissue.

Treatment.—The treatment of such ulcerations consists in the protection of the parts from friction and keeping them surgically clean.

In the first stage the patient should be kept very quiet and the parts washed frequently with permanganate of potash or peroxide of hydrogen, followed by a 1-to-2,000 solution of bichloride of mercury. A pledget of gauze soaked with the latter solution should be placed between the folds of the buttocks to prevent their rubbing against each other and thus developing other ulcers. When the pruritus is marked, a solution of methylene blue may be painted over the parts once in twenty-four hours.

After the purulent discharge has been checked, applications of some drying powder, such as bismuth, stearate of zinc, or nosophene may be employed. A mixture of equal parts of starch and boric acid is a very good and inexpensive application. Where the ulcer is sluggish and disinclined to heal, an occasional touching of the parts with tincture of iodine or nitrate of silver will hasten the process.

Regularity in the faecal movements and attention to the general constitutional condition, giving tonics, if necessary, and regulating the diet by wholesome, non-irritating foods, will generally be sufficient in

these cases; but one should always bear in mind the possibility of secondary infection of the ulcer by tubercle bacilli.

Herpetic Ulceration of the Anus—Herpes.—Herpes is not frequently spoken of as an affection of the rectum and anus. This is surprising considering the number of cases which have been reported. Engle-Reimers (*Jahrbücher der Hamburg. Staats-Krankenanstalten*, vol. ii, p. 98, 1890) has reported 25 cases of herpes ani that occurred in 1,872 women affected with venereal disease.

Syphilographers in general acknowledge its frequent appearance about the margin of the anus. While it is not generally understood that it has any etiological connection with syphilis or other venereal affections, it occurs frequently upon the genital organs and seems to have some contagious element. It occurs at the margin of the anus close to the muco-cutaneous border, but involves the skin just as it does at the margin of the lips. It may follow malarial fever, acute attacks of indigestion, or occur during the course of pregnancy.

Pathology.—The pathology of this disease is not clearly understood. It occurs as an idiopathic affection, and is also associated with many diverse conditions. It may be due to a neurosis, to local irritation, or to a special parasite, as has been claimed by St. Clair Symmers (*Brit. Med. J.*, December 19, 1891). It is also claimed that it is due to rheumatism or gouty diatheses, but this seems very hypothetical.

Symptoms.—Herpes occurs as single or grouped vesicles over which the epidermis is elevated, and in which is an accumulation of clear or milky-white serum. These develop after a slight itching or burning sensation in the parts. They sometimes coalesce, forming one large bleb, around which there may be considerable œdema of the tissues.

Owing to the contact of the parts these blebs soon rupture and leave raw surfaces. They do not bleed, and at first discharge only a serum which forms a sort of yellow crust over them. This soon drops, however, leaving an open door for infection by the germs which are always present in the skin about the anus or in the fœcal passages; thus an ulceration develops. In such cases the herpetic nature disappears and we have to deal with a simple ulcer. At this period it is very difficult to distinguish the disease from chancroid or even true chancre, especially if the parts have been irritated by cauterants or acrid discharges from the vagina. It may generally be distinguished by the period of incubation, slight amount of induration, lack of destructive tendency, and absence of glandular involvement.

Treatment.—When seen in its first stages treatment is always rapidly effectual. The bleb should be opened and its thin covering excised, the parts should be washed with an antiseptic solution, and after this a soothing drying powder should be applied. Either aristol or noso-

phene act extremely well in herpetic sores because they absorb moisture and form a sort of protecting shield over the parts.

The prevention of relapses is of paramount importance in these cases. The vesicles are liable to return on the slightest provocation. The parts should therefore be kept scrupulously clean and protected from friction by pledgets of gauze. They should be bathed in astringent solutions, such as alum, tannic acid, and sulphate of zinc, to toughen the epidermis. Quinine, strychnine, and arsenic should also be administered for their effect upon malarial and nerve complaints.

Eczema of the Anus.—Eczema is not an infrequent affection of the anus. Ordinarily it appears under the erythematous form and is accompanied by superficial fissures radiating from the center, which sometimes extend into the anal canal. It is very often associated with the same type on the scrotum and elsewhere in the body.

In its chronic form there is a certain amount of infiltration of the perianal tissues. The skin is dry, brittle, and easily cracked by any stretching.

The term moist eczema is no longer recognized by dermatologists, but there sometimes occurs an alteration in the erythematous form around the rectum which justifies this nomenclature.

Vesicles containing serum, such as are described under the title of Eczema Vesiculosum, have not been observed, but around the margin of the anus and between the folds of the buttock there occurs a moist, red condition of the skin following the original erythema and characterized by burning, itching, and a watery discharge. This exudation possesses that gluey character which stiffens fabrics and gives them a slightly yellowish tinge when it comes in contact with them. It is not associated with any formation of crusts, probably on account of the close apposition of the parts, which prevents rapid evaporation. On the buttocks and in the perineal and coccygeal sulci this moist, exuding condition gradually fades off into the erythematous form upon the scrotum and skin.

For the etiology of this disease the reader must consult the works on dermatology.

Treatment.—Attention to hygienic conditions, regulation of the bowels, dietary control, and the internal administration of such medicines as will overcome those diathetic conditions characterized by deficient oxidation and imperfect functional action of the organs in consequence, will all be necessary for the successful treatment of this condition. In the first place the uricæmic state, if present, should be attacked by the administration of alkaline diuretics, the flushing out of the kidneys with large quantities of water, and sometimes one will find piperazine a prompt and effectual remedy. Arsenic, sulphur, and

small doses of iodide of potash have been highly recommended. Piffard speaks in glowing terms of *viola tricolor* in this condition, and states that it has a decided action upon the kidneys, to which is probably due its influence upon the disease. He advises its use in small doses in acute cases, and in large ones in chronic conditions, varying in amount from one drop to a teaspoonful according to the age of the patient and the chronicity of the disease.

As to the local treatment, it would require a volume to even mention the many combinations and preparations suggested for the treatment of eczema ani. All irritating substances should be avoided. Hot water applied persistently is one of the best ways of relieving the congestion, itching, and irritation of the parts, and to this one may add a small quantity of bicarbonate of soda. Some authors strongly disapprove of washing the parts. Frequent scrubbing and friction of the diseased area is objectionable, but the application of hot water does not necessitate any such friction; it is simply daubed on with a soft wad of gauze or a clean sponge and held to the parts until it begins to cool off, when it should be reapplied as hot as the patient can bear it.

If there is much sero-purulent discharge, the application of peroxide of hydrogen in the strength of 10- to 25-volume solutions will sometimes rapidly control this and also relieve the pain and itching. The old-fashioned blackwash is very effectual in the relief of these symptoms. Unguentum zinci oxidi, unguentum diachylon, hydrargyri ammoniati, unguentum picis liquidi, or lanolin in which is incorporated a small percentage of bismuth, salicylic acid, resorcin, or carbolic acid, may be applied. The strength and selection of these different ointments will depend upon the individual cases. Some are found in which all washes and oily ointments are absolutely irritating, and it is therefore necessary to limit ourselves to some form of medicated powder. Lycopodium or the ordinary talcum toilet-powders, the subnitrate of bismuth, and sometimes dermatol act with good effect upon the irritated conditions of eczema. All of these should be preceded by careful bathing with antiseptic solutions and gently drying the parts with soft absorbent gauze before the powders are applied. Stearate of zinc combined with a small percentage of salol or aristol is very soothing to the patient and productive of healing.

Where the eczema is of the dry variety, with thickening and infiltration of the skin, deep fissures and puckering of the mucous membrane about the margin of the anus, a more active treatment may be necessary. Scarification with a cold or hot knife are inadvisable because infection and deep ulcers are likely to ensue. The fissures should be touched with strong solutions of peroxide of hydrogen or with the actual cautery, and graphite ointment should then be applied. Ichthyol, 5 to 20

per cent, is an excellent remedy in these cases. After thickening and infiltration have disappeared, the use of hot water, ointments, and washes as advised above may be begun.

Rodent Ulcers.—Under the above title Allingham originally described a number of ulcers of destructive type occurring around the margin of the anus. Among these he included a number which were of a distinctly tuberculous nature. In the last edition of his work he divides these cases into two classes, the lupoid and the rodent ulcers. In the first class he describes those with typical tubercular manifestations, and in which tubercle bacilli can be demonstrated. He still insists, however, upon the occurrence about the margin of the anus of certain characteristic ulcers, which are neither tubercular nor malignant. He states that they occur in otherwise healthy individuals; that the edges of the ulcers, although hard and well defined, are less elevated, and the bases more indurated; that they are superficial in the beginning, but have a greater tendency to extend into the deeper tissue; that the surfaces are more red and dry, and that the discharge is much less than in lupoid ulcers. How they originate, whether in traumatism, moles, warts, or cellular infiltration, he does not state. The description given resembles very closely the typical Jacob's ulcer or lupus exedens of dermatologists. This type of ulceration does not attack the mucous or muco-cutaneous borders. They are ordinarily described as attacking the skin about the face, where they attain considerable size, and extend down to the bones themselves. Dennis states that they begin as a hyperplasia of the epithelium belonging to the sudoriparous and sebaceous glands or the hair follicles; that the pressure of this hyperplasia causes atrophy of the rete Malpighii, but not degeneration; that the ulcers differ from epithelioma in that the lymphatic nodes are less liable to become infected, there is none of that typical ingrowing of the surface epithelium, and the cells are smaller and the nuclei spindle-shaped.

Fordyce states that the infiltration at the base of these ulcers is always less than in true epithelioma, and the distinguishing feature between the two is the disproportion that exists between the ulceration and the new growth.

The disease always occurs late in life. It has no connection with pulmonary tuberculosis or any other constitutional disease. Its course is very slow, the pain is limited, and the lymphatics are seldom involved. The discharges are scant, thin, and sanious. The ulcer itself is harder than the lupoid, but there does not exist below it that marked development of fibroid or cicatricial tissue which characterizes the latter type.

Histological examination shows aggregations of epithelial cells arranged symmetrically throughout the structure. The capillary blood-

vessels are largely increased, but there is no marked change in their walls. Tubercle bacilli and giant-cells are absent.

From these facts one is led to the conclusion that this type of ulceration is nothing more or less than a mild form of epithelioma modified by senile processes.

Diagnosis.—It is almost impossible to distinguish these ulcers in their early stages from the simple tubercular or lupoid types. The characteristics above described are not well enough marked. They so closely resemble the other varieties that one would not be justified to reach a positive conclusion until a microscopic examination had been made, and it had demonstrated the absence of tubercle bacilli and giant-cells with their three inflammatory zones.

Treatment.—As the rodent ulcer is a type of epithelial growth, its treatment should be carried out upon this basis. The radical excision of the tumor will appeal to every surgeon; however, experience with excision of epitheliomas at the anal margin has not been as satisfactory as could be wished, because there seems to be a great tendency to recurrence. The author has seen but one removed from this site that did not return within two years; one that involved the margin of the anus and about 1 inch of the mucous membrane was removed in 1894, and the patient remains well up to the present time, but four others removed since that time have recurred. Radical cure is more likely to be obtained by caustic potash or arsenical paste, used according to the methods of Robinson, who has been so successful in the treatment of these conditions upon the face. There is no reason why these pastes should not be applied to the margin of the anus as well as to the cheeks, lips, and facial regions. In one case in which this treatment was applied the results were very satisfactory. Local and internal medication have little or no effect upon the disease, but of late some excellent results have been obtained by the use of the Roentgen rays in this type of ulcers.

ULCERATIONS OF THE ANAL CANAL

The ulcerations previously mentioned involve the cutaneous tissues and are outside of the influence of sphincteric contraction.

The etiological factors in the present type are practically the same as of those in the perianal region. Chancres, chancroids, secondary and tertiary syphilis, tuberculosis, epithelioma, traumatisms, and infections may all produce ulceration of this tract. It may occur through extension from the perianal region and from the rectal cavity itself, or it may originate in the anal canal. Where it extends from the perianal region into the anal canal the diagnosis may be made from the nature of the external ulcer, the depth and extent being determined by digital and

ocular examination. Where they originate in the rectum it is much more difficult, as the nature of the ulcer below may be entirely different from that which causes it. Carcinoma and stricture of the rectum are often associated with simple ulcer of the anus.

Most ulcers of the anal canal assume the form of fissures at first, and present the same symptoms—viz., pain at or following stool, spasm of the sphincter, bleeding, and suppuration. The typical painful ulcer of the anal canal is a fissure, called also irritable or intolerable ulcer, which will be discussed in a separate chapter. It is not sufficient that a patient complains of pain, sphincteric spasm, and occasional bleeding to make a diagnosis of fissure in ano. The nature of the ulcer is of the utmost importance in the diagnosis and treatment. Tuberculous, epitheliomatous, and venereal ulcerations between the radial folds of the anus may all produce these symptoms, but treating them as such would end disastrously. Traumatic ulcers that follow operations or injuries may assume the shape of fissure, but without the characteristic pain and spasm of the sphincter one would not characterize them as such. They are simple, non-irritable, or tolerable ulcers. In many of these cases the sphincter will have been dilated during the operations which produced them, and yet there will remain fissure-like ulcers, which are slow to heal, although painless and without any hypertrophy or spasm of the muscle. This condition is due to repeated infection by the faecal passages. In distinction from true fissure none of these ulcers ordinarily occur singly, but often two, three, or four of the sulci between the radial folds are affected at the same time. Moreover, they generally extend more or less into the mucous membrane of the rectum and outward upon the cutaneous tissue. The bases are not indurated, and there is an abundant purulent discharge, sometimes tinged with blood, which is not the case in fissure.

Another fact of importance is that in simple, venereal, and tubercular ulcers of the anal canal the lesion is quite as frequently upon the sides as at either commissure of the rectum, whereas in true fissure or irritable ulcer the lesion in 85 per cent of the cases is situated immediately at or just to one side or the other of the posterior median line.

The symptoms and diagnosis of the specific forms of ulcer will be found in the preceding chapters.

Simple Ulcers of the Anal Canal.—As just stated, these are usually due to extension from other parts or to traumatism with infection. They may affect the sulci alone, or they may involve all the circumference of the anus. Such ulcers not infrequently follow operations for hæmorrhoids, especially by the Whitehead method, for resection of the lower end of the rectum, for prolapse, and for rectocele. They do not

ordinarily burrow deeply, but in healing, especially if their course is protracted, they are very likely to leave fibrous strictures.

The symptoms are tenderness and pain at stool or on sitting down, a constant discharge of pus, and gradually increasing difficulty in movement of the bowels. Diarrhoea or frequent desire to defecate, without satisfactory results, and aching pain in the back and testicles, are often present. Dysuria is frequently an annoying symptom.

Treatment.—Such ulcers are often very difficult to heal even when the sphincter has been cut or stretched. The protection of the parts against constant reinfection is not easy. An oily dressing containing ichthyol usually accomplishes this as well as any other, but sometimes an application of nitrate of silver, after thorough cleansing with hydrogen peroxide, will form an albuminoid coating, which acts quite well. Moist absorbent dressings act better in these cases than drying powders.

Rest in bed is almost a prerequisite for cure, and if the hips can be kept a little higher than the chest it will be all the better. Occasionally, however, when the ulceration surrounds the anal canal no local treatment seems effectual, notwithstanding all such causes as syphilis, tuberculosis, and epithelioma are absent. In such cases one may succeed by dissecting out the entire ulcer and suturing the edges of the wound together.

ULCERATIONS OF THE RECTUM AND SIGMOID

The rectum is very frequently the seat of various types of ulceration, any of which may extend into the sigmoid. Traumatic lesions, and consequently infected ulcers, are much less frequent in the latter. This is explained by the fact that the parts are in relation with soft, elastic tissues, they are movable, and the course of the blood-vessels is circular. Thus a hard faecal mass does not bruise the pelvic colon, as it would the rectum; in straining, the force is not exerted against an immovable and resistant wall, as in the rectum, and finally the sliding of the faecal mass over the surface, the erect posture, and abdominal pressure do not obstruct the circulation and cause congestion, as they do in that part of the gut where the vessels run up and down. Aside from the traumatic, pressure, and syphilitic types, however, ulcerations are quite as frequent in the sigmoid as in the rectum. The two parts are so inseparable, and the pathology and symptomatology so similar, that it is best to study them together, always bearing in mind, however, the differences in relationship and anatomical construction.

From a pathological point of view, and for convenience of description, they may be divided into simple, specific, and systemic ulcerations. The term specific is still used here in the broad sense in which

it was employed at the beginning of this chapter. The simple ulcerations are those due to traumatism or any other cause followed by infection from the bacteria present in the intestinal canal. They are—

1. Traumatic.
2. Catarrhal.
3. Varicose.
4. Hæmorrhoidal.
5. Follicular.
6. Strictural.

The specific ulcers are those due to infection by bacilli not normally present in the human system. They are—

1. Tubercular.
2. Venereal.
3. Dysenteric.
4. Diphtheritic.
5. Carcinomatous (?)

The systemic types are those due, or at least secondary, to grave constitutional or organic diseases. They are—

1. Nephritic.
2. Diabetic.
3. Trophic.
4. Hepatic.
5. Marasmic.

Some of these divisions overlap one another in a measure, as both pathological conditions may be present in the same individual and operative at the same time in the production of ulceration. In such cases there may be two distinct ulcers present in the same rectum, or we may have the two types combined there, forming a sort of mixed ulcer. Thus there may be simple ulceration of the mucous membrane along with carcinomatous involvement of the rectum at a higher point. Catarrhal, hæmorrhoidal, and specific ulcerations may be all present at the same time in one individual. A simple traumatic ulcer may become infected by tuberculosis or syphilis, and thus its nature will be entirely changed from what it was when first observed. It will be impossible to repeat these complications under every type of ulceration, but the reader should constantly bear them in mind, and in clinical work apply the diagnostic tests in every case.

The specific ulcerations having already been described, the simple and systemic types will be considered.

Etiology.—Certain predisposing causes and symptoms are common to many if not all types of ulceration in the rectum and sigmoid. They may therefore be enumerated here once for all, and referred to under the special varieties in order to avoid repetition.

Predisposing Causes.—Age: Rectal ulcerations are rare in very young children, but in old people those types due to pressure, varicose veins, and trophic changes are quite frequent. The condition, however, is much more frequently seen in middle life. This may be due in part to the preponderance in numbers at this age over the very old, but it is also influenced by the more constant straining at exercise or labor, exposure to accidents or injuries, and the frequency of surgical operations. In women the menstrual and child-bearing periods also predispose to it.

Sex: Women are more subject to ulceration of the rectum on account of the greater frequency of constipation, pressure on the organ by misplaced or gravid uteri, tumors, badly fitting pessaries, and injuries during childbirth; also from the exposure of the organ to the acrid and irritating discharges from the vagina. The influence of these conditions, together with the various inflammations of the reproductive organs and pelvic cellulitis in the production of rectal and sigmoidal disease, is not sufficiently appreciated. Many cases of pelvic disease in women fail to obtain relief after operations and treatment simply because the intestinal conditions which they produce have not been treated at the same time.

The interdependence of these two classes of diseases requires a technical knowledge of both in order to treat either one successfully.

Occupation: Occupation has some influence in the production of the disease, in that those individuals who are standing upon their feet most of the time, whose duties require them to lift heavy weights and strain, and who are preoccupied sufficiently to interfere with regular attention to the functional action of their bowels, are liable to suffer from constipation, congestion, and other conditions, such as bring about ulcers of the rectum and sigmoid. Painters, workers in lead and phosphorus, tailors, seamstresses, artists, etc., are all frequent subjects of ulceration of the rectum.

Physiological Functions.—The functions and position of these parts are most important predisposing causes. Forming, as they do, the final portion of the intestinal tract and serving as storehouses for the harsh and indigestible refuse, they are subject to continued pressure by the mass, and to abrasions and wounds from the foreign bodies which it may contain. Whenever the accumulation of fæces remains for any protracted period in the rectum or sigmoid it becomes very hard, and by its constant pressure and to-and-fro movements, caused by peristalsis and respiration, it is likely to produce congestion, abrasion, or even actual wounds of the mucous membrane.

Bacteria: The fact that there are always present in the intestinal canal, especially at the lower end, numerous bacteria and bacilli, predis-

poses these organs to ulceration by the facility with which any injury of the parts may become infected.

Bacillus coli commune, *staphylococcus*, and *tubercle bacillus* are more or less constantly found here, and no amount of attention can keep the parts free from exposure to infection by them. In other cases peculiar bacteria are found. N. Sолоjew (*Centralbl. für Bakteriologie, Parasitenkunde und Infektionskrankheiten*, 1901, I. Abtheilung, vol. xxix, pp. 821-830) has reported a fatal case of ulceration of the colon and rectum due to the *balantidium coli*. The ulcers were extensive and involved the entire mucosa, dipping into the muscular coat. While various micro-organisms were found upon the surface, only this peculiar parasite penetrated the deeper parts of the ulcers. He therefore considers it the etiological factor.

The author has recently seen a case of chronic diarrhoea with ulceration of the rectum and sigmoid in which *amœbæ dysenteriae* were found at first, and later on numerous *trichomonas intestinalis*. Thayer (*The Journal of Experimental Medicine*, vol. vi, p. 75) mentions this same fact. He also calls attention to the presence of *strongyloides intestinalis* in the colon in certain cases of chronic diarrhoea with intestinal ulceration. The etiological influence of these parasites in the production of ulceration has not yet been determined, but the large variety of such agents found in the alimentary tract makes the wonder grow that we do not more frequently observe infection and ulcerations there.

Anatomical Causes.—The distribution of the superior hæmorrhoidal veins, the fact that they possess no valves, and that the collateral circulation below is so feeble, predisposes the rectum to constant congestion and ulceration. Especially is this true in consequence of the blood pressure upon these parts produced by the erect posture.

Pathological Predisposing Causes.—Aside from the specific diseases, such as tuberculosis, syphilis, dysentery, etc., certain other constitutional and organic diseases predispose to this condition. In general, one may say whatever enfeebles the circulation and reduces the cardiac force, so that it does not move the blood rapidly through the portal circulation, will predispose to congestion and ulceration of the rectum. Valvular disease of the right side of the heart, hepatic disorders, and atheroma of the arteries all contribute to this disease.

As to the special diseases there seems to be some lack of harmony among writers as to whether they simply predispose or actually occasion the condition. It is a question whether Bright's disease has any peculiar influence in producing ulcers of the rectum through the accumulation in the system of poisonous detritus which should be eliminated by the kidneys; or whether, as Da Costa has brought out, in the later stages of this disease the secretory organs of the body, especially the liver, the

pancreas, the spleen, and the heart as well, all take on more or less of the sclerotic involvement of the kidney, and thus become a part and parcel of the disease, the rectal ulcers being secondary to the involvement of these organs, and not due to the chronic inflammation of the kidneys alone. Of course in those cases which always occur in the late stages of Bright's disease there is feeble cardiac action, general vascular dilatation, and decreased blood pressure. In fact, all the tissues of the body are in a degenerated or enfeebled condition, and predisposed to suffer more than usual from slight traumatisms, as well as being easy victims to infection by septic bacteria. At the same time, as we shall see later on, the type of ulceration seen in these cases is entirely different from any other rectal ulceration, thus lending color to the view that it is due to Bright's disease itself.

The ulcers of the rectum that are caused by diabetes are similar in their nature to gangrene of other portions of the body as produced by this disease. It is simply a gangrenous or necrotic condition of the mucous membrane that results from traumatisms or thrombotic obstructions in the venules, and may occur in acute as well as chronic cases of this disease. The author has seen one case in a woman whose diabetes lasted only a short time, and yet during that period the most extensive ulcerations of the rectum and sigmoid occurred. There was nothing left of the mucous membrane of these two organs beyond little islands or patches about the size of a silver quarter, as high up as the longest sigmoidoscope would reach. The fact that the ulceration extended after the glycosuria had disappeared is in keeping with other reports of ulceration of the skin and gangrene of the extremities that occurred after the glycosuria had disappeared.

Profound anæmia is a predisposing cause of ulcers of the rectum, as it is of ulcers everywhere else. These patients are generally the subjects of obstinate constipation, the stools are hard, and traumatism from this source frequently affords an open gate to the bacterial infection which results in the ulcerative process. Neuroses and mental diseases have been frequently spoken of as predisposing causes to ulcers of the rectum and colon. In the chapter upon mucous and ulcerative colitis attention has been called to the fact that these diseases are very frequently met with in institutions for the nervous and the insane. Some authors have taken the view that it is the result of trophic changes, while others believe that they are due to specific, and even to contagious bacilli (Cowan). On the other hand, lack of attention to the calls of nature, want of exercise, and altered nervous conditions, such as reduce peristalsis and vascular tension, all tend to produce conditions which predispose to ulceration of the rectum and sigmoid. Four cases of ulceration of the rectum and one of the sigmoid have been observed in cases of non-syphi-

litic, multiple spinal sclerosis; in one case even an artificial anus failed to heal the ulcer. It appears, therefore, that these neuroses may be even more than predisposing causes in some cases.

Exciting Causes.—Traumatism or injury is the exciting cause of the large majority of non-specific ulcerations of the rectum. These may be due to surgical operations, rough introduction of syringe tips, the improper use of bougies, the application of cauterizing agents, the injection of corrosive substances in the treatment of hæmorrhoids, the passage of hard faecal masses, the introduction into the anus or passage through the bowel of foreign bodies, and the rupture of hæmorrhoidal veins.

Next to surgical procedures the passage of foreign bodies, such as bones, pins, fruit seeds, gall-stones, etc., is the most frequent source of ulcerations. The sharp points of these little bodies project out beyond the faecal mass and scratch the mucous membrane, thus causing small wounds, which soon become infected and cause ulcerations.

Pressure: Prolonged pressure from impacted faeces, from arrest of the foetal head, from pelvic tumors, and from too large pessaries, may interfere with the circulation, cause sloughing of the mucous membrane, and thus produce ulceration of the rectum.

Crypts: The lodgment of foreign bodies or small masses of hard faeces in the crypts of Morgagni may sometimes cause ulcerations which extend upward and involve the rectum.

Drugs: Finally, the toxic action of certain drugs or chemicals, such as mercury, capsicum, mustard, phosphorus, ergot, and carbonate of ammonia, have been known to cause ulceration of the rectum and pelvic colon.

General Symptoms.—The symptoms of ulceration of the rectum are very similar in many respects for all varieties. The size of the ulcer as a rule bears no relationship to the amount of disturbance it produces. Extensive ulceration well above the internal sphincter may cause very slight and indefinite symptoms, whereas a very small ulcer situated low down may occasion great pain, muscular spasm, nervous irritability, and reflex disturbances in nearly all the organs of the body.

Diarrhœa is one of the early symptoms of this disease. It sometimes comes on with an acute attack of griping and pain in the course of the colon. Such cases are due to colitis, and are described in the chapter upon that subject. Frequently, however, it occurs as a gradually increasing frequency of faecal movements. At first these will be comparatively normal and of sufficient amount. They will grow smaller as the desire becomes more frequent, and instead of passing faecal material the patient will have frequent calls to the stool, at which nothing more than a small quantity of mucus will be discharged.

Sometimes this mucus is tinged with blood, at others there may be considerable quantities of pure blood poured out along with pus. Occasionally the patient will pass quantities of material resembling boiled sago. Later on these discharges change to a dark and grumous material due to decomposed blood mixed with mucus, fæces, and pus. The character of the discharge differs considerably in the various types of ulcerations, as will be described under their appropriate headings.

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Delafield (Medical Record, 1895, vol. i, p. 577) states that this morning diarrhœa is a constitutional or neurotic condition not due to local inflammation or disease, and describes five varieties, according to the severity of the symptoms, but leaves one to infer that there is no organic disease of the intestinal tract to account for them.

With such an opinion every close observer in rectal diseases will take most positive issue. True morning diarrhœa, such as he has described in his last four divisions, is pathognomonic evidence of local inflammation, stricture, ulceration, or neoplasm of the rectum, sigmoid, or colon. There is no condition that more positively demands an early and thorough examination of the rectum and sigmoid flexure than this tendency to go to stool immediately upon rising in the morning, especially if that morning stool consists in mucus or purulent discharges. There are persons who have a normal call to defecate as soon as they rise, or shortly after rising, in the morning; the passages are normal and there is no continuous call throughout the day in such cases. But these are an entirely different class from those described by the author mentioned and which are discussed here. The morning diarrhœa, which consists in the passage of mucus or pus, is due in almost every instance to ulcerative disease of the rectum or sigmoid.

Pain.—This is a very unreliable and indefinite symptom in ulceration of the rectum. Certain individuals suffer greatly from it, while others have no pain at all. If the ulceration is high up in the rectum a sense of weight and aching in the sacral region is the chief discomfort of which most patients complain. If it is situated lower down within the grasp of the sphincter, and involves the muco-cutaneous area where the sensitive nerve-ends center, pain of a sharp, lancinating, or burning character will be the chief symptom.

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ulceration. Tubercular ulcers are almost entirely free from it. Syphilitic ulcers vary considerably in this regard; sometimes they are very sensitive, at others the patient is almost absolutely without any pain, but this depends upon the location. As a rule ulceration of the rectum proper is not an acutely painful affection.

Incontinence.—Relaxation of the sphincter is not an infrequent symptom of ulceration of the rectum. Sometimes patients almost entirely lose control over their faecal passages owing to this condition. It does not occur, however, except where the disease has existed for a long time or has been brought about either by serious constitutional diseases or vicious practices.

The symptoms elicited by sight and touch vary with each particular class of ulcers. These variations when within reach can be appreciated by the educated touch, but the various instrumental aids for ocular examination of the rectum enable us at the present day to distinguish between the different ulcers much more clearly than before. Through the pneumatic proctoscope one can clearly see and diagnose ulcerations in the upper portions of the rectum and in the sigmoid; the character of the ulcers can be determined and the amount of contraction in the caliber of the gut can be accurately measured without any danger of perforation. The appearance of special ulcerations will be described under their proper headings.

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Traumatic Ulceration of the Rectum.—This form, termed also simple ulceration of the rectum, always originates in some injury to the parts. The ulcerative condition is due to infection of the raw surfaces by the bacteria always present in the rectum. This distinguishes them from those ulcerations which are due to specific bacilli, such as tuberculosis, typhoid fever, dysentery, etc.

Ulcerations following surgical operations, when in patients otherwise healthy, tend toward spontaneous healing, but they may sometimes be protracted on account of the irritation caused by the passage of hard faecal masses and the impossibility to keep them clean.

The lower the seat of an ulceration in the rectum, provided the sphincter is kept relaxed, the more rapidly will it heal, because the faecal materials do not rest so persistently upon the parts and cleanliness is rendered more possible. Thus in open operations for hæmorrhoids or fistulas the tendency is always for the lower portion of the wound to cicatrize before the upper portion. Another thing which must always be taken into consideration with regard to these traumatic ulcers is the trophic condition of the parts. Whenever an ulceration

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in the rectum shows a tendency to chronicity it is evidence that the resisting power of the tissues is not sufficient to overcome the constant infection from the intestinal contents. The circulation is either imperfect, the nerve supply is impaired, or the general reparatory processes are below par. Constitutional treatment, therefore, becomes a necessary feature in the management of these cases.

Characteristics.—The appearance of such ulcers is largely the consequence of the injury or wound in which they originate. If these involve only the mucous membrane the ulcers will be superficial and assume the form of the original lesion. If, however, the operation or injury involves the deeper tissues of the gut wall they will then assume the penetrating form, and, if not properly treated, may burrow into the perirectal tissues and form an abscess or fistula. When upon the anterior wall of the gut they may even perforate the peritonæum or the vagina.

The edges of the ulcers are generally smooth, sloping, and non-indurated. The bases are composed of simple granulations, neither nodular nor proliferating, bathed in a thick, milky-white secretion containing pus-cells, streptococci, colon bacilli, and the other bacteria usually present in the rectum.

When the ulceration extends low down in the rectum, involving the anal canal, it may assume the form of a fissure in ano. However, ulcerations resulting from surgical operations very rarely present the symptoms of this condition owing to the fact that the sphincter is generally well stretched as a preliminary step.

Symptoms.—The symptoms of traumatic ulcers are practically described in the foregoing paragraph on general symptoms. They possess no peculiarities beyond that of chronicity, and frequently this tendency is only comparative. Ulcerations following operations for hæmorrhoids should not be expected to heal under three to four weeks, and they may require five or six, while those produced by operations for fistula and stricture sometimes require three to six months in which to heal. The constitutional condition of the patient has much to do with this. The fact that an operation or an accidental wound of the rectum or anus is slow in healing should not lead one to conclude that it is tubercular, syphilitic, or malignant without much stronger evidence. Assuming the erect posture too soon, too little and improper attention to dressings and cleanliness, anæmia, poor circulation, and feeble reparative powers may all bring about tardiness of healing in a perfectly healthy wound.

Treatment.—The treatment of this type of ulcers consists in perfect drainage, aseptic cleanliness, regulation of the bowels, and rest in the recumbent posture. If the sphincter is not relaxed it should be dilated.

The parts should be irrigated with antiseptic solutions two or three times a day, and applications of astringent solutions, such as nitrate of silver, ichthyol, or Peruvian balsam should be made.

Powders, such as have been mentioned under specific ulcerations, will be useful after the discharge is practically controlled. Iodoform is one of the best in this condition.

Catarrhal Ulceration.—In the chapter upon catarrhal diseases of the rectum it was stated that ulceration may result from any one of the three varieties—the acute, hypertrophic, or atrophic catarrh.

The ulcerations that result from acute catarrhal inflammation of the intestine are due to excessive inflammatory processes, followed by necrosis of the mucous membrane and consequent sloughing. This ulceration is a superficial condition, and is generally quite extensive, involving more or less of the entire lining membrane of the rectum. The symptoms are those of an acute inflammatory disease, followed by a frequent desire to defecate and the passage of blood and pus. The mucous membrane around the margin of the anus is generally inflamed, and cedematous, if it is not also involved in the ulcerative process. The patient suffers from acute pains upon defecation, aching and discomfort in the sacral region, and always has more or less temperature at different times of the day, especially in the evening.

Ulcerations from the hypertrophic form of catarrh are very rare. They are more likely to assume the follicular type and be localized in the solitary follicles or lymphoid glands. They do not produce any marked subjective symptoms, they rarely bleed, and discharge a thin sero-purulent material which is not feculent but quite irritating to the muco-cutaneous membrane.

The ulceration caused by atrophic catarrh is generally more of an erosion than an ulceration. It consists in a localized breaking down of the mucous membrane. The edges are not elevated or swollen, but gradually decline to a shallow crater-like base. They bleed easily upon touch, though not excessively. They discharge a thick tenacious mucopus which can be seen adhering to the spots when examination is made by the speculum (Plate I, Fig. 6). This muco-pus often contains small bits of inspissated faecal matter which gives the discharge a dark-brownish color at times. Owing to the scarcity of the discharge diarrhoea is not a frequent symptom in this form of ulceration.

The minute description and treatment of these varieties of ulcerations has been given in the chapter upon catarrhal diseases and need not be repeated here.

Varicose Ulceration.—Under the above term many writers have confused two separate and distinct varieties of ulceration. Rokitsky

(Manual of Path. Anat., vol. ii, p. 107) described under the name of "hæmorrhoidal ulcers" a condition which Gibbs, Kelsey, Curling, and others have called varicose ulcers of the rectum. It is necessary for the proper understanding of this subject to clearly distinguish between an ulceration due to a varicose condition of the rectal mucous membrane and those due to injury, strangulation, or sloughing of hæmorrhoidal tumors. An ulcerated hæmorrhoid or an ulcer that occurs in a well-developed hæmorrhoid is an entirely different condition from those chronic, intractable ulcers which occur in general varicosity of the rectal mucous membrane.

The lamented Gibbs, whose tragic death was the first fatality in our late war with Spain, has clearly drawn this distinction (New York Medical Journal, 1892, vol. ii, p. 93). Ball describes the same condition, but unfortunately adopts the nomenclature of Rokitansky, who first likened it to chronic varicose ulcers of the leg. The conditions are almost identical, but if one examines these ulcers in the rectum he will find no hyperplasia or fibrous thickening beneath them, such as is seen in varicose ulcers of the leg. They show no tendency to cicatrize, as do the latter type, and bleed much more easily, owing to the thin vascular walls of this area.

Again, the so-called varicose ulcers of the leg are associated in the majority of cases with chronic syphilis; those in the rectum are not. Their chronicity is undoubtedly due to varicosities of the superior hæmorrhoidal veins. The original exciting cause, however, is unquestionably some wound or injury to the mucous membrane, or rupture of one of the varicose veins. Infection takes place after this and causes the ulceration. Whatever tends to produce varicosity of the rectal veins is a predisposing cause to the condition.

Cripps (*op cit.*, p. 206), Quénu and Hartmann (*op. cit.*, p. 413) state that these ulcers are peculiar to old age. In the series of cases described by Gibbs there was a number under the age of twenty years, and the majority of them occurred in people between twenty and fifty years of age. The author has seen this character of ulceration in a patient as young as seventeen years, and in the large number of old people in the New York Almshouse he has only seen three of these ulcerations in patients above the age of sixty, whereas in his clinical and hospital services he has seen a large number that occurred in patients between thirty and fifty years of age.

Mode of life, environment, and nutrition seem to have very little influence in its production. Heavy eaters and drinkers who take little exercise and are inclined to constipation are predisposed to this type of ulceration, but it also occurs in abstemious, active, and anæmic individuals. The etiological factors in one type of cases are congestion of

the liver and constipation; and in the other feeble cardiac action and weak relaxed blood-vessel walls.

Symptoms.—The ulcers usually occur well above the muco-cutaneous border. As a rule, they produce very few symptoms besides the frequent desire to defecate. This inclination is always more marked in the daytime, the patient often passing the whole night without being disturbed. There is always an inclination to go to stool immediately upon rising in the morning, which generally results in the passage of small quantities of mucus and pus, with or without blood. Occasionally these patients suffer from quite severe hæmorrhages. One or two cases have been reported in which death was caused by this accident, but ordinarily bleeding is not a marked characteristic.

Pain, other than a dull aching in the back, sometimes shooting down the leg or around the pelvis, is generally absent, as might be expected from the location of the ulcer above the muco-cutaneous border. Occasionally when they invade the muco-cutaneous tissue at the margin of the anus the patient suffers from more or less acute pain. In this condition spasm of the sphincter will also complicate the ulceration.

The appearance of the ulcers upon ocular examination is that of a sharply defined, irregular depression in the mucous membrane of the rectum. The edges are slightly elevated, and the bases covered with a yellowish pus, beneath which there are bright-red granulations. The veins of the rectum surrounding the ulcerated portion, and, in general, all over the rectum, are varicose, and when the patient strains they become largely dilated. The patient may or may not have well-developed hæmorrhoidal tumors. When such is the case the ulceration occurs at the side of or between two such masses. Ordinarily these ulcerations are superficial, but, as Gibbs states, they sometimes eventuate in great destruction of tissue, even perforation of the bowel.

One striking characteristic is their extreme chronicity, with little or no tendency to extend either in area or depth; one case was seen in which the condition existed for five or six years, the ulcer remaining about the size of a twenty-five-cent piece, and with absolutely no contraction of the caliber of the gut.

Tenesmus and griping are ordinarily absent.

The condition of the bowels will depend upon other circumstances; when they are soft and semifluid, bleeding and pain will be generally absent; when they are hard, lumpy, and irregular, a small amount of blood will appear with and after the stools, and a dull aching pain may follow and last for an hour or two.

Digital examination reveals nothing more than a lesion of the mucous membrane, with slightly elevated edges, and a soft elastic base.

There is little if any hyperplasia or thickening of the intestinal walls about or beneath these ulcers.

Treatment.—The treatment of varicose ulcers of the rectum is very tedious and frequently unsatisfactory. It is very difficult to get patients to appreciate the importance of a condition which gives them so little real pain or inconvenience. At the same time it is almost impossible to heal these conditions without absolute rest in bed. They insist upon sitting up, if they yield at all to the advice of confinement. They want to be propped up in bed, clothe themselves, and lounge about the room in chairs or upon sofas, or even want to attend to business a few hours each day. In chronic cases, with general varicosity of the rectum, such lax regimen will rarely succeed. The patient should be confined absolutely in a reclining posture. He may lie upon his side, his back, or his stomach if he wishes, but his head should be on a level with or as little elevated above his hips as possible. The modern treatment of varicose ulcers of the leg by the elevation of the limb has proved beyond a doubt the benefit of removing the pressure of the blood column in these conditions. So also in the rectum, in which this column is even more unsupported than in the leg, there being no valves in the veins, it is necessary to relieve the parts of that mechanical element of congestion in order to bring about the healthy circulation and consequent restoration of tissue which has been destroyed. If this were conscientiously enforced, it is believed that the majority of cases of simple and varicose ulceration would heal of their own accord. Nevertheless something may be done toward hastening such a cure.

The diet should be regulated so as to contain as little refuse material as possible. An absolute milk diet is not best for these patients, as it produces a hard, leathery stool, which, when passed through the rectum, tears and irritates the already inflamed surfaces. An albuminoid diet associated with a reasonable amount of fresh garden vegetables is more acceptable as well as more effectual. A certain amount of milk may be allowed with this diet, as it is nourishing and produces no bad effects in combination with the other food. Alcohol, and if possible tea and coffee, should be avoided, also all such condiments as mustard, pepper, and the various sauces.

The bowels should be kept regular but not loose. After the bowels have moved, and at least twice a day, the rectum should be irrigated with a cleansing solution, either of bichloride of mercury (1 to 10,000), boric acid, or Thiersch's solution, the ordinary rectal irrigator being used for this purpose. By this means no accumulation of fluid will be left in the rectum to irritate the parts and cause a tendency to defecate.

As local applications to these ulcerations a variety of substances are useful. Most authors advise nitrate of silver in mild solutions. Occa-

sionally, where the ulcer is sluggish and the base is sloughing, the application of this agent may be of benefit. My own experience, however, has been that tincture of iodine or a 10-per-cent solution of argonin acts better. The insufflation of a powder of iodoform, aristol, or, better still, antinosin upon these ulcerations seems to hasten their healing, and also gives the patient the impression that something is actually being done to heal the parts while he is resting in bed. This should be done once or twice daily through a fenestrated or duck-bill speculum. If the pain is severe a suppository of iodoform, opium, and belladonna may be introduced two or three times a day to relieve the same. As to giving any definite quantities of these drugs, it is impossible to judge what will relieve one patient by any experience with another. Some are very susceptible to opium, others to belladonna, and still others to iodoform, and the proportion must be varied in each individual case.

Injections of starch-water or of flaxseed tea containing small quantities of the tincture of opium, or ointments containing small quantities of cocaine, may be of benefit, especially if the ulcers are so low down in the rectum as to involve the sensory nerves. In the majority of cases, however, the symptoms will not indicate the use of analgesics. Four to ten weeks or more may be consumed in healing.

Drugs, such as hypophosphites, cod-liver oil, protonuclein, and sometimes some assimilable form of iron, should be used in cases associated with anæmia and general debility. Where signs of improvement do not manifest themselves very soon, it is wise to eliminate all possibility of syphilis by beginning mercuric inunctions.

Massage is useful in all patients confined to bed, and makes up in a measure for the lack of exercise. Forced feeding, such as is employed in neurasthenia, should be avoided in these cases. The danger is in overeating and congestion of the portal circulation. Sufficient wholesome food should be allowed, but the digestive organs should not be overtaxed. Water may be allowed in abundance, especially if taken hot, and when there is any uricæmic tendency, citrate of lithia may be added to it.

Hæmorrhoidal Ulcers.—In distinction to the above variety there is the lesion caused by sloughing and ulceration of a well-defined hæmorrhoidal mass. This may be due to thrombosis followed by necrosis, traumatism from the passage of hard fæcal masses or foreign bodies, strangulation, or too rough handling of the tumor in efforts to reduce it. It may also be produced by the application of ice in order to relieve congestion, and by the action of corrosive substances applied to the surface or injected into the body of the hæmorrhoid for the purpose of curing it.

Such ulcerations are entirely distinct from the varicose ulcerations which have just been described. They are associated with a localized inflammatory condition; the hæmorrhoidal tumor itself is swollen and hard; the ulceration usually consists in a fissure-like crack or split through its center, or in a protruding stump from which the hæmorrhoid has sloughed away. Where it is due to thrombosis, traumatism, or corrosive injections, it generally assumes the fissure-like appearance in the body of the tumor. Where it is due to necrosis following strangulation, the application of ice, or cauterization, the summit of the tumor will slough off and leave an ulcerating, teat-like stump. These ulcers do not possess the extreme chronicity of the varicose variety—in fact, they have a tendency to heal spontaneously.

Symptoms.—The symptoms of this variety of ulceration are: First, a history of the existence of hæmorrhoids either internal or external, and of prolapse, strangulation, efforts at reduction, the application of ice or cauterizing agents for the restoration or removal of the tumors. After these conditions a fulness, throbbing, and aching of the parts will have been experienced by the patient. Sometimes he will have suffered from a chill and elevation of temperature. These symptoms will have been suddenly relieved by the discharge of pus or blood. Then follows an inclination to frequent movements of the bowels, which are generally ineffectual, and associated with considerable pain. The discharge is scanty and composed of pus and blood. Serious hæmorrhages sometimes occur; there is always more or less spasm of the sphincter, and the pain is more marked than in the varicose variety. Where the hæmorrhoid is only partly destroyed it may prolapse, and being grasped by the sphincter, cause acute suffering.

Morning diarrhœa may or may not be present, but the patient is frequently awakened at night by the spasmodic contraction of the sphincter and the desire to defecate. If the hæmorrhoid is of the external or mixed variety the involvement of the muco-cutaneous border may take place, and when such is the case the symptoms of fissure develop.

Treatment.—The treatment of this form is entirely different from that of varicose ulceration. It is absolutely and unequivocally surgical. The patient should be etherized, the sphincter thoroughly dilated, and the ulcerated hæmorrhoidal mass taken away either by crushing, the clamp and cautery, or by ligation.

The clamp-and-cautery operation by its stimulating effect and bactericidal action seems to be as near a specific as one can desire. Where the ulcerated hæmorrhoid is cleft in two by a deep furrow, each lateral prominence should be clamped separately and the ulcerating sulcus between them cauterized with a narrow-pointed Paquelin blade, but if

the furrow does not dip down deep, the whole mass may be included in the clamp and removed.

The after-treatment of such cases is identical with that for ordinary hæmorrhoidal operations, with this exception: that more prolonged rest in bed, antiseptic washes, and restricted diet will be necessary to obtain perfect results.

Follicular Ulceration of the Rectum.—Follicular ulceration may occur at any portion of the large intestine. Its most frequent site is in the descending colon, sigmoid, and rectum. It has its origin in the accumulation of small round cells in solitary follicles. This accumulation causes a swelling of the follicle followed by pressure on the epithelial covering, which finally gives way. The follicle disintegrates, and an ulcer results having sharply cut edges, slightly undermined, and varying in depth (Plate I, Fig. 5). They vary in size from that of a small bird-shot to a small hazelnut. They may be single or multiple, the whole mucous membrane being studded with them; they are more frequent above the recto-sigmoidal juncture than below it; they do not often coalesce, but occasionally the mucous membrane between two may break down, and thus form an irregular ulcer.



FIG. 100.—IMPACTED FÆCES IN CAVITY OF A FOLLICULAR ULCER.

White states that all the patients in whom this has been found post mortem have died from other causes, such as dysentery, typhoid fever, tuberculosis, cancer, or membranous colitis. He states further that the disease occurs about once in 500 post-mortem examinations at Guy's Hospital, and yet with this important percentage he says that it is never diagnosed during life. This latter opinion is not in accordance with that of other observers. The author has certainly seen the condition in the rectum and sigmoid flexure of living subjects a number of times. In the majority of cases catarrhal disease precedes its development. That perforation may occur from this form of ulceration is exemplified in Fig. 100, illustrating the cavity of such an ulcer filled with fæces. It will be seen that only the peritonæum itself separates it from the abdominal cavity. In this case numerous follicular ulcerations of the sigmoid had involved and almost perforated the intestinal wall. Healing occurs slowly, but is not accompanied by the development of any marked cicatricial deposit. Ball (*loc. cit.*, p. 119) states that this condition may result

in stenosis of the bowel, but the writer has never seen a case of this kind.

Symptoms.—The symptoms of this form of ulceration are very meager. In the rectum itself the patient experiences no pain and no uneasiness. There is some indication of intestinal indigestion associated with more or less griping and tenesmus, but without any real diarrhoea.

The action of the bowels may be perfectly normal so far as the constituency of the mass is concerned, but the patient will complain of more or less acute griping pains throughout the day and night.

Bamburger has described little masses of inspissated mucus, looking something like frogs' spawn or boiled sago, as having been discharged from the bowels of patients suffering with this condition. The little masses are said to be more or less of the nature of follicles, but Virchow has shown them to be particles of undigested starch, and therefore it is doubtful if they have any real relationship to follicular ulceration. In the early stages, before ulceration takes place, one may occasionally feel little millet-seed-like formations beneath the mucous membrane, or elevations upon its surface, but it requires a delicate touch to do this. Examination with the speculum, which is the only positive means of diagnosis, shows in this stage very slight elevations, over which the membrane appears smooth and shining.

The causes of this variety of ulceration are practically unknown, but inasmuch as it always occurs in connection with some other inflammatory affection of the rectum, it seems rational to regard it as an infection of the follicles by the discharge from these diseases.

Treatment.—The treatment consists in attacking the causative disease and applying local remedies to the ulcers so far as they can be reached. In the case illustrated the patient was suffering from atrophic catarrh of the rectum and sigmoid. The treatment consisted in that detailed in the chapter upon this disease, and the four or five ulcers which could be reached were treated by wiping them out with small pledgets of cotton and insufflating antinosin upon the ulcerated spots. The patient recovered in about six weeks, and has not been troubled with the condition since.

Stricture Ulceration.—Cripps (*loc. cit.*, p. 204) describes in detail a condition of ulceration which he states is due to retained discharges from a rectal stricture. He says: "It appears as if the superficial part of the mucous membrane is only ulcerated, the submucous tissue still forming a distinct membrane over the muscular coat, so that the bowel, instead of possessing a soft, velvety lining, moving freely on the subjacent muscular fibers, has a surface which, though smooth, gives a

harsh creaky sensation to the finger, and is intimately blended with the muscular coat. This extensive superficial ulceration may gradually spread beyond the rectum to the colon. At a post-mortem examination the ulceration is found to end very abruptly. So sharp is the line of demarcation between the ulceration and the normal membrane that it looks as if cut with a knife." The cases of this variety of ulcer have all been afflicted with cicatricial stricture of the rectum.

The author has seen a number of such cases with superficial ulceration of the mucous membrane above the site of the stricture, but he is not convinced of the pathology which Cripps indicates—viz., that the destruction of the mucous membrane results from contact with purulent secretion. Necrosis of epithelium or ulceration must exist before purulent secretion is established. It appears more rational, therefore, to attribute these ulcers to the irritation, traumatism, and infection produced by forcing the faecal mass through the narrowed channel or their retention above the stricture.

Strictures of the rectum are very liable to be associated with constitutional conditions, such as tuberculosis, syphilis, carcinoma, or exhausting disease, which conditions also produce inflammation and ulceration of the mucous membrane of the rectum and sigmoid. Moreover, where the patient is debilitated from improper feeding, irregular movements of the bowels, and reflex disturbances of the digestion, the mucous membrane of the intestine is very likely to take on a feeble circulation associated with a cellular deposit in its glandular organs, which accumulates until by its pressure it causes a necrosis and subsequent ulceration of the tissues. The fact that in the case which Dr. Cripps quotes the stricture was cut and the obstruction and retention of the discharge relieved, and yet the ulceration progressed until it involved the whole of the bowel up to the splenic flexure, proves that there was some other etiological factor to account for it.

Symptoms.—The symptoms of ulceration such as this are practically those of stricture. There is a frequent desire to defecate, and yet inability to accomplish the same; only when the bowels are fluid can the patient succeed in having a satisfactory faecal movement. When this has been accomplished, his desire to defecate is usually relieved for twelve to fourteen hours, after which the inclination recurs and frequent small passages of pus or mucus and blood take place.

Diarrhoea alternating with constipation, inability to pass well-formed faeces, tympanites, and the accumulation of faecal materials in the intestinal canal are all symptoms of this variety of ulceration, as they are of stricture of the rectum. The discharge of pus and blood shows the presence of ulceration. The pathology and treatment of these ulcers will be found in the chapter on Stricture.

Dysenteric Ulceration.—This disease has been discussed in a previous chapter, but it is necessary to say something more concerning the chronic ulcers which follow it.

Dysentery, while it may, and often does, involve the whole of the large intestine, has its seat most frequently in the sigmoid flexure and rectum. It is in these lower portions of the alimentary canal that its chronic results occur. This is logical from the fact that all of the detritus and infectious bacteria which are discharged or carried downward by the peristaltic action of the gut above must pass through and lodge for greater or less periods in these lower segments of the gut. As a result, therefore, of acute, sporadic, or epidemic dysentery one may sometimes see a chronic circumscribed ulcer of the rectum or sigmoid with the typical symptoms of diarrhoea, pus, blood, and mucus in the stools. These symptoms accompany all forms of rectal ulceration from whatever cause they arise, and render it difficult to distinguish a true dysenteric ulceration from other varieties. Indeed, ulceration of the rectum and sigmoid are often mistaken for and called chronic dysentery.

The presence of the *amœbæ dysenteriae* or the bacillus of Shiga will positively establish the dysenteric nature of any given ulcer. As Kelsey states, there is no doubt that the disease is one of the causes of chronic ulceration and stricture. It begins in an infiltration of the mucous membrane with a fibrous exudation. This infiltration increases until it interferes with the blood supply of the mucous membrane, the latter sloughs, is cast off, and an ulceration results. If this slough is superficial, the membrane may be soon restored to its normal condition, but if the infiltration be deep and involve the submucous tissues, the loss of substance will be more or less extensive, and cicatrization and stricture may result.

The ulcers may be small and localized, or they may extend over large areas, and sometimes entirely surround the canal; they may be trough-like, stellate, or irregular in shape (Fig. 86); they may be single or multiple. Perforation has been known to occur, but it is not a frequent accident.

Habershon says "the coats of the bowels may become sinuous abscesses," so that on dividing prominent portions of the mucous membrane between two ulcers several drams of pus may escape.

Woodward, in his *Surgical History of the War of the Rebellion*, states that there has been no case reported during or since the war of intestinal or rectal stricture having followed dysenteric ulceration. This is only a negative statement, however.

Kelsey (*New York Medical Journal*, 1891, vol. i, p. 733) reported a case of a strong, healthy man, who had had dysentery one year before, and had never recovered. He had lost 30 pounds; suffered from pain

at the end of the spine, which was continuous during the day, but not so at night. He had six or eight stools during the day, but at night he was not annoyed. The stools were foul-smelling, contained blood and mucus, and were misshapen. It seems perfectly clear from the history that the intestinal irritation originated in the dysenteric attack, and that the condition had continued from that attack to the time of the examination. Local treatment having failed, Kelsey at once performed a left inguinal colotomy, and exploring the sigmoid flexure while the abdominal wall was open, positively determined an inflammatory stricture of the lower segment of this organ, which he states he believed to have been due to dysenteric ulceration. The fact that all who have seen a number of cases of dysentery have also observed by rectal examination the erosion, inflammation, and even ulceration which occur during the course of the disease, renders it impossible to believe otherwise than that dysentery may result in chronic, extensive ulceration with fibrous and cicatricial deposit, which ends in stricture.

Carcinomatous Ulceration.—The symptoms of ulceration of the rectum are so similar to those of carcinoma that it is sometimes very difficult to determine between the two conditions. Absence of pain, morning diarrhœa, discharges of mucus, blood, and pus are common to the two conditions, and in any given case suffering from such symptoms the possibility of malignant neoplasm should always be borne in mind.

The fact that carcinoma exists in the intestinal walls, and through its pressure and interference with the circulation of the parts causes a breaking down and sloughing of the mucous membrane over this neoplasm, does not prove that the ulcer itself is of a carcinomatous nature. Indeed, it may be a simple ulcer imposed upon or brought about by the neoplasm. The treatment of the ulcer in distinction to that of the carcinoma may be sometimes of great relief to the patient by reducing the amount of the discharge, thus obviating too frequent and exhausting diarrhœa, and keeping the intestinal caliber sufficiently open to admit of fœcal passages. The subject is mentioned here as a type of ulceration simply to impress upon the reader the necessity of constantly keeping in view the possibility of an ulcerative condition being due to malignant neoplasm.

Ulceration from Bright's Disease.—As mentioned several times before in the course of this work, we frequently notice in autopsies, where death has resulted from chronic Bright's disease, widespread ulceration of the rectum and large intestine. Dickinson (Croonian Lectures for 1876) first called attention to this fact. The ulceration is always very extensive but superficial, involving only the mucous membrane of the gut. It occurs in the later stages of the disease, and until within the past few years has been rarely recognized during life. There is no

tendency to perforation of the gut or any thickening or induration of its walls. The condition seems to be due to amyloid or lardaceous degeneration of the mucous membrane and its glandular organs.

Symptoms.—Aside from the general constitutional and local manifestations of the nephritic condition, such as œdema, anasarca, enfeebled heart action, debility, and reduced urinary secretions, symptoms of indigestion, a tendency to diarrhœa, and great flatulency mark this complication of Bright's disease. The patient suffers little if any pain in the rectum, but after a period of comparative constipation, he gradually begins to notice a looseness of the bowels, with excessive fluid discharges. At first these discharges are watery, but later they become milky white and purulent, and contain many shreds of degenerated or sloughing tissue.

Examination of the rectum shows the whole organ to be denuded of its lining membrane. The sloughing or ulceration is not in patches, but appears as a general disintegration of the mucous membrane. While there are no marked hæmorrhages, the granulations bleed easily though not excessively upon touch. The griping and tenesmus are not marked, but the patient soon loses sphincteric control. The fluid passages run away from him involuntarily, and his condition is pitiable indeed. Happily this is one of the latest stages of the kidney affection, and is indicative of an early termination. In one case which the author saw some years ago, the patient had no idea that she was suffering from anything more than anæmia when she consulted him for an uncontrollable desire to defecate; she was having at the time some six or seven stools a day, which did not annoy her so much as the fact that when the desire occurred it was impossible to control the same or to wait a moment. Examination of the urine showed a large percentage of albumin with abundant granular and epithelial casts. The mucous membrane was denuded over the first four or five inches of the rectum, and the discharges from the intestine consisted of thin faecal material and large quantities of pus. Occasionally a little blood was mixed with these discharges, although this was not frequently the case. No local or constitutional treatment availed to control the symptoms, and the patient died, at the end of four weeks, from uræmic poisoning.

Treatment.—The treatment of this condition is hopeless, but something can be done to relieve the suffering. The rectum and sigmoid should be washed out with saline or boric-acid solution twice daily, and after this has come away, 2 to 4 ounces of 25- to 50-per-cent solution of aqueous fluid extract of krameria should be introduced into the sigmoid. A few minims of deodorized tincture of opium may be added to quiet peristalsis and control the diarrhœa. The diet should be bland and concentrated, such as milk and meat extracts. Occasional saline

purges to relieve the kidneys of too much work will do no harm, but, as a rule, it is better to do this by keeping the skin active. Medication should be directed to the kidney condition. Tannic acid, tannigen, and such remedies should be avoided, but small doses of sulphate of copper or nitrate of silver are admissible, and sometimes they control the diarrhœa remarkably well.

Diabetic Ulceration.—During the course of diabetic glycosuria constipation often comes on in consequence of the atonic state of the bowels, deficient exercise, and the withdrawal of carbohydrate foods. Occasionally, after this condition has existed for some time, flatulence will be markedly developed, and sometimes excessive peristalsis and the *tormina ventosa* of Kussmaul are easily aroused; with these conditions there appears a serous diarrhœa associated with a discharge of pus and blood, no satisfactory explanation of which has yet been given. Clinicians are all aware of the tendency in diabetics to ulceration and gangrene of the lower extremities and of the skin, especially where any pressure is exercised upon the parts. Frerichs, Ferraro, Kleen, and others have reported ulceration of the intestinal canal in patients who died from this disease. No one, however, has established any etiological relation between the two conditions.

It occurred to the author some years ago that pressure from the hardened fecal masses during the constipated period of the disease might also cause ulceration in the rectum and sigmoid. The examination of three cases which developed diarrhœa during the course of diabetic glycosuria has enabled him to verify this theory. In one the ulceration was limited to the rectal ampulla, and extended over a space about the size of a silver half-dollar; it was isolated and involved the mucous and submucous tissue; the edges were dry, and the base feebly granulating. In the other two cases the ulcerations were numerous and extensive throughout the rectum and sigmoid flexure. Strange to say, just about the time that these occurred, or shortly thereafter, the excretion of sugar almost entirely ceased. In one of these cases the ulcerations healed, but the diabetes recurred, and she succumbed later to this disease with recurrence of the rectal complication. In the other two cases the diabetes has not recurred, and the patients have recovered from the ulcerative condition and remain apparently well. In all three cases there was a history of marked constipation preceding the diarrhœa.

In the two cases with extensive ulcerations the stools varied from eight to twelve a day. They were composed of quantities of pus tinged with blood, and did not possess any particularly feculent odor. Once or twice during the day they would pass more or less hard, lumpy, fecal material. In one the muco-cutaneous margin was involved, occasioning

so much pain that it was necessary to dilate the sphincter in order to give the patient any rest. This patient also suffered from bedsores, owing to lying in the recumbent posture.

Large doses of codeine used to control the glycosuria seemed to have no effect upon the diarrhoea. Frequent irrigation, however, with a 20-per-cent solution of aqueous fluid extract of krameria, together with ichthyol internally, succeeded in controlling the condition, and restored the patient to health after about twelve weeks' treatment. There is no distinct literature upon this subject, nor is it possible to base any very positive conclusions upon these limited observations, but the condition is noted here as it has been observed, and a wider experience, it is hoped, will determine its true pathology.

Hepatic Ulceration.—Ulceration of the rectum not infrequently occurs in cases of chronic cirrhosis of the liver. There is no specific influence in the hepatic disease to produce this result. The obstruction to the portal circulation causes congestion and dilatation in the superior hæmorrhoidal veins, and frequent hæmorrhages from these result. The infection of the rupture in the vein causes the ulceration. These generally assume the form of ulcerated hæmorrhoids. They occur upon the summit of the hæmorrhoidal mass, and not between them.

Treatment.—The treatment of this condition consists principally in attacking the disease of the liver. One may be tempted to operate upon the hæmorrhoidal condition, and thus remove the ulceration and check the hæmorrhages. This, however, is not ordinarily a wise procedure. As stated in the chapter upon Hæmorrhoids, the checking of these periodic losses of blood is likely to be followed by acute anasarca and rapid aggravation of the hepatic disease.

The bowels should be kept freely open and the rectum irrigated daily with antiseptic solutions. If there is a tendency for the hæmorrhoids to become strangulated by spasm of the sphincter, this muscle may be stretched. Beyond this, operative interference is likely to do more harm than good.

Trophic Ulceration.—In the chapter upon Colitis we have already called attention to the trophic ulcerations of the large intestine, and have referred to them as occurring also in the rectum and sigmoid flexure. Ackland and Targett both claimed that ulceration of the large intestine may be due to diseases of the central nervous system, and report cases which seem to confirm their opinion. White has reported two cases occurring in Guy's Hospital which seem to corroborate this view.

Cowan and Eurich state that the general lowered vitality of the insane renders them an easy prey to all sorts of disease, and that the

cases of ulceration of the rectum and colon in this class of patients is more likely due to some other cause, such as traumatism and infection, than to trophic neuroses.

Ulcerations of the rectum occurring in spinal disease and neurasthenia have been referred to, but there is no reason to suppose that they did not result from the usual causes. On the whole, while there are some evidences in favor of this type of ulceration, there are no characteristic symptoms or positive proofs that it actually exists.

It may be worth while to mention in this connection two cases of ulceration of the rectum and sigmoid following injuries to the spinal cord, with paraplegia and temporary loss of sphincteric control. In both of these cases the paralytic symptoms disappeared, but there was a marked decrease in sensibility about the anus. In one there were numerous ulcerative patches throughout the rectum and in the lower portion of the sigmoid flexure. There was no tuberculosis or syphilis in either case to account for the condition. Without being able to discover any other cause, it is thought possible that these might be cases of trophic ulceration due to injury of the cord.

Marasmic Ulceration.—Some years ago it was the privilege of the author to make autopsies on a number of children who had died from the condition known as marasmus. The ages extended from two months to three and a half years. A number of these cases turned out to be tuberculous, the mesenteric glands being enlarged and containing tubercle bacilli. In others there were gummatous developments in different portions of the body which indicated syphilitic disease. In 5 cases, however, there was no evidence of either of these specific affections. The children seemed to waste away and die simply from malassimilation and exhaustion.

An examination of the intestines in these cases showed in 3 of them extensive ulceration of the rectum, sigmoid, and colon. In one case the ulcers extended well into the ileum. The condition resembled very much that seen in the late stages of Bright's disease. There were left here and there patches of mucous membrane, but these were always covered with a sort of flaky deposit resembling very much the beginning of diphtheritic membranes. Microscopic examination, however, failed to reveal any specific bacilli in them. The walls of the gut were not infiltrated or thickened, and there was no approach to perforation in any of the cases. Two of these cases were being treated for summer diarrhœa at the time of their death. The stools, however, differed from the ordinary flocculent, green ones of this disease, in that they contained considerable quantities of pus tinged with blood and very little mucus. The explanation of this latter fact lies in the destruction of the epithelial layer of the mucous membrane and the consequent

absence of goblet-cells. In all of the cases there was a history of gradual wasting disease before the diarrhœa began.

The stools at first had contained considerable mucus with blood, but they had gradually become thinner, containing more pus than mucus, until in the later stages they were almost entirely composed of pus and undigested milk. The condition is undoubtedly the result of impaired circulation, probably accompanied by thromboses of the intestinal veins.

The symptoms are those of a gradually increasing diarrhœa occurring in marasmic children. There is little pain or griping, and the stools gradually change from the green, mucous type to pus, serum, and undigested food.

It is impossible to lay down any definite lines of treatment, as every method failed in the cases seen. Reasoning from the condition observed, however, one would suppose that some relief might be obtained by flushing the colon freely with saline solutions. This would have to be done with the child in the knee-chest posture and through a long rectal tube, inasmuch as the sphincters are always so relaxed that the fluid would flow out immediately if injected into the rectal ampulla. The general treatment of the constitutional condition will, however, do more for the patient than any local applications. For this, however, the reader must be referred to works upon diseases of children.

CHAPTER IX

FISSURE IN ANO—IRRITABLE ULCER—INTOLERABLE ULCER

THE terms which head this chapter have been used by various writers to describe a type of anal ulcer characterized by acute pain during or after stool. Gosselin first distinguished between the acutely sensitive lesions at this point and those which were less so, calling them tolerant and intolerant ulcers. Allingham designates the sensitive type as "irritable ulcer." Mollière suggested the better terms tolerable and intolerable, holding properly that all ulcerations of this region occasioned some pain. The word fissure signifies a crack or elongated break in the tissues. It may occur anywhere in the body, but in common parlance it is applied generally to the lesion in the anus. It is an ulcer, but distinct from those destructive and extensive types which have been described in the previous chapters. Technically it is limited to the sulci between the radial folds; it spreads up and down but not circularly, does not involve the tegument covering the folds and columns of Morgagni, and is painful at or after stool or upon the escape of gases from the anus.

It occurs in all ages and conditions of life, but is more frequent in the young than in the very old. In infants the disease is very likely to be the result of hereditary syphilis, but this is not necessarily the case. It is chiefly found in adult life and in women, especially during the child-bearing period.

Sex does not seem to influence it materially. Allingham says it is more frequent in women, and Goodsall, working in the same hospital, finds it oftener in men; in 329 cases of fissure he found it 190 times in men and 139 in women. In 324 cases collected by the author from different sources it occurred 176 times in women and 148 times in men.

It may be single or multiple, but the typical painful fissure is nearly always single. The multiple variety is rare except in atrophic catarrh, gonorrhœa, and syphilis. In these conditions multiple fissure-like ulcerations are comparatively frequent. Goodsall found in 221 cases that fissures were single in 208; there were 2 fissures in 12 cases, and 3 in only 1.

Shape of Ulcers.—Much importance has been attached by writers upon this subject to the shape of the lesions. Most authors attempt to confine the term to those linear or elliptical ulcers which are con-



FIG. 101.—FISSURE IN ANO.

finied to the groove between two anal folds (Fig. 101). Recently, however, no particular importance is attached to the shape. It may be linear, pear-shaped, elliptical, or round. Quénu and Hartmann in an elaborate study of a number of cases have come to the conclusion that this fissure-like or elongated shape is only apparent, and that where it is dissected out and laid flat upon a block the ulcer assumes a circular or elliptical form. It is the site between the radial or mucous folds, within the grasp of the sphincter, which gives it the elongated shape and characterizes it. In its other fea-

tures it does not differ from any simple ulcer; the edges are generally inflamed and slightly elevated, but not indurated; they may be ragged (Fig. 102) and appear slightly undermined, but the latter feature disappears when the ulcer is stretched open. The base is either a bright-red granulating surface which bleeds easily upon touch, or it may be composed of grayish, fleshy granulations covered by a thick pus or pseudo-membrane. The elevated edges are folded or tucked in by the contraction of the sphincter, so that they rest upon the base of the ulcer, thus irritating it and preventing healing as well as causing pain.

At the lower end of the fissure there is frequently a hypertrophy of the skin or muco-cutaneous tissue which resembles an external pile, and has been called by Brodie the *sentinel pile* (Fig. 103). This may be divided into two ear-like flaps by the fissure; it is always painful

to the touch, and when dragged upon it brings on characteristic pains.

Location.—The site of the fissure in ano is variable and may occur at any point from the cutaneous margin to the upper limits of the columns of Morgagni; the majority begin just above the ano-rectal line and extend downward. It may also occupy any point in the anal circumference. In men they are most frequently seen at or near the posterior commissure, and rarely upon the sides or anteriorly. In women they are comparatively often seen at the anterior commissure. In 132 cases in men recorded by Goodsall, the fissure was found at the anterior commissure but once, and in 89 women it was found there 12 times. The significance of these locations will be appreciated when the etiology and symptomatology of the disease are studied.

Etiology.—If all ulcers of the anal canal are considered to be fissures it will be necessary to invoke as etiological factors catarrhal diseases, gonorrhœa, chancroid, syphilis, tuberculosis, etc. The typical anal fissure is an ulceration entirely distinct from these types, not in its shape, for all of them may assume the elliptical or irregular shape; not in its depth, for this is variable in all varieties; but in its etiology, its symptomatology, and progress. From day to day, if one carefully observes a simple traumatic fissure of the anus, he may see signs of cicatrization at its margin which comes and lasts for short periods, only to break down again. Sometimes even the ulcer will heal completely and remain so for a short period, breaking down again under the influence of hard faecal passages and straining at stool. Surgical operations may result in fissure-like ulcerations, but eventually these heal in the majority of cases without leaving a typical cicatrix.

Fissures may originate in any wound, excoriation, eruption, or inflammation around the anus. Anything which weakens the tissues and renders them liable to abrasion will act as a predisposing cause.

The exciting cause, however, is nearly always the passage of hard faecal masses with or without foreign bodies in them. The fact that women



FIG. 102.—IRREGULAR FISSURE OR IRRITABLE ULCER OF ANUS.

are more frequently constipated than men will account for the apparently greater proportion of fissures in this sex. Injury to the mucous membrane by syringe-tips, straining, or a severe sneeze or cough, may rupture the delicate mucous membrane of the anus and cause fissure.



FIG. 103.—FISSURE WITH SENTINEL PILE IN SYPHILITIC CHILD.

Allingham states that gelatinous and fibrous polypi are not at all uncommon causes of fissure: "The polypus is usually situated at the upper or internal end of the fissure, but it may be on the opposite side of the rectum." Whatever causes narrowing of the anal canal, such as congenital malformation, hypertrophy and contracture of the sphincter or levator ani muscle, and stricture, may result in fissure. The condition may also result from parturition, the passage of the child's head through the vagina so distending the rectum as to tear the mucous membrane. It is also said to result from malpositions of the uterus, such as anteversion and retroversion.

The fact that a large majority of patients suffering from fissure are also afflicted with a greater or less degree of hæmorrhoidal disease would indicate that there was some etiological relation between the two. The statement of Quénu and Hartmann (*op. cit.*, 421) that 70 to 80 per cent of fissures are due to hæmorrhoids does not seem reasonable; it is more likely that the irritation produced by the fissure results

in a hyperæmia and congestion about the margin of the anus, and is thus the cause rather than the result of hæmorrhoids. The author has seen a number of cases of fissure in which the hæmorrhoidal symptoms—protrusion, bleeding, and backache—all came on after the original symptoms of fissure. The costiveness which causes the fissure will also account for the hæmorrhoids, so the relation therefore appears coincident rather than etiological. Boyer's theory that the fissure is due to spasmodic contraction of the sphincter puts the cart before the horse and is no longer considered seriously.

Ball has advanced the idea that typical fissures are due to tearing of the crypts of Morgagni. He says that they are brought about by the lodgment of small fæcal masses in these little pockets, which being pressed upon by hard stools cause the edges of the valves to tear; this rent is gradually extended by every subsequent passage until the whole depth of the crypt is torn through and the muco-cutaneous tissue of the anus is thus involved (Fig. 104). This theory is very plausible, and the frequency with which fissures occur at the anterior and posterior commissure is entirely in keeping with the anatomical fact that the crypts are more highly developed in these areas than in any other portion of the rectum. A series of examinations instituted after the publication of Ball's article (Brit. Med. Jour., 1891, vol. ii, p. 583) have shown that upon each side of the posterior commissure there is almost always a well-developed valve of Morgagni and one directly in the middle line of the anterior commissure in women; and a study of all the cases of fissure observed since has shown that the ma-



FIG. 104.—FISSURE PRODUCED BY RENT IN CRYPT OF MORGAGNI.

jority occur at these two points. Moreover, a careful examination of fissures will frequently show two little papillæ or teats, which would indicate the tearing through of a fold of the muco-cutaneous tissue; sometimes this fold is not entirely torn through, and the fissure presents a slight pocket underneath the lower border accompanied with hypertrophy of the skin externally. This hypertrophy represents the well-known sentinel pile of Brodie which has been described. From all these facts it seems reasonable to conclude that while fissures may occur at

any portion of the circumference of the rectum through a solution of continuity in the covering membrane from any cause, it is likely that many cases are due to the tearing of these little crypts as claimed by Ball. There remain, however, a large number which occur in the very middle of the posterior commissure, above which point there is no crypt; these are explained by the direction of the canal above the commissure, which is backward, and consequently the mass exerts its greatest pressure there.

Pathology.—The pathological changes in fissure vary from the slightest abrasion to deep ulceration and destruction of tissue. In some only the most superficial layer of the muco-cutaneous tissue is involved, while in others even the muscular fibers themselves are either laid bare or become involved in an inflammatory process accompanied by fibrous deposits and alterations in the vascular and nerve supply. In the superficial variety, those which may be called acute, there is no induration of the base, no thickening of the edges, and no great hypertrophy of the sphincter muscle. In the chronic state, however, the edges of the ulcers are elevated, irregular, and thickened, the base is hard and inelastic, and the sphincter muscle is hypertrophied and very resisting. In this state it might be very difficult to distinguish the simple fissure from a true Hunterian chancre. The time which it has existed and the absence of other specific manifestations during that period should decide this question. The elongated ulcer occurring between the radial folds low down occasions a higher degree of sphincteric spasm and hypertrophy than does the small round ulcer which occurs above the ano-rectal line. There is also more induration and inflammatory involvement of the neighboring tissue in the linear than in the round ulcer.

Microscopic examination of excised fissures has been made by M. Hartmann (*op. cit.*, p. 422); upon the surface of the ulceration there was a granular layer of round cells of unequal thickness lacking in places; below this was a fibrous layer in which were scattered numbers of round cells and fusiform granules crossed by bosselated blood-vessels running parallel to the surface; still lower was a layer of smooth muscular fibers more or less separated from one another by fibrous tissue, and below this a cellular adipose layer in which ramified the blood-vessels with their tunics and primitive nerve-roots. In the adipose region the nerves and the vessels appeared normal, but in the deep muscular layer the nerve-trunks were surrounded by fibrous material (Fig. 105). They were altered and granular, and distinguished by their lamellar sheath, and showed interstitial and intrafascicular neuritis (Fig. 106). The mucous and muco-cutaneous border of the ulceration presented a cavernous transformation, the epithelium assumed a strati-

fied, translucent appearance, the prolongations of the epidermis were destroyed, and there was an infiltration with granular cells accompanied by venous thromboses and small intercellular hæmorrhages.

There was no evidence in any of the sections of exposed nerve-ends. The history of the cases from which these sections were taken is not given in Hartmann's report. It is well known clinically that the pain in fissures varies according to their duration; at first it is burning, cutting, and lasts only a short time; but after they become chronic, it is a dull, throbbing ache which radiates to the back and down the legs. In the first a sensitive nerve-end may be found exposed, whereas in the second this sensitive nerve-end may have been destroyed by the ulcerative process, and the peri- and interstitial neuritis may have taken place in the nerve deeper down. It would have proved more interesting and instructive if Hartmann had taken a series of cases in their initial stages as well as these apparently chronic cases from which he made the microscopic examinations. At the same time these studies are of the greatest importance, and enable us to explain in a measure the old aching, throbbing, dull pain which follows defecation in chronic fissure, even after they have healed by cicatrization. On the other hand, its pathology will not explain the acute, burning, tearing pain

which occurs in the early stages of acute fissure, because in these cases there is no induration, no hypertrophy of the sphincter, and no possibility of the neuritis as above described. Here it is simply a question of a raw surface exposed to the irritating action of the fæcal passages, which surface differs in no wise from that at any other portion of the body, save that the tissues are somewhat more highly endowed with sensitive nerve-ends. It is impossible, therefore, to conceive of a lesion in these tissues without an exposure of some of those numerous nerve filaments which supply the anal canal, and this exposure accounts for the characteristic pain in the early stages.

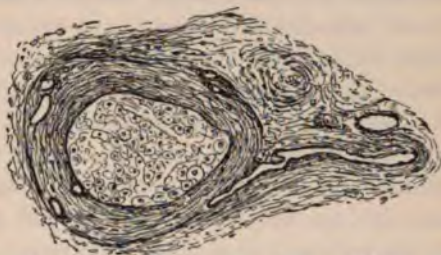


FIG. 105.—PERINEURITIS IN CHRONIC FISSURE (Quénu and Hartmann).

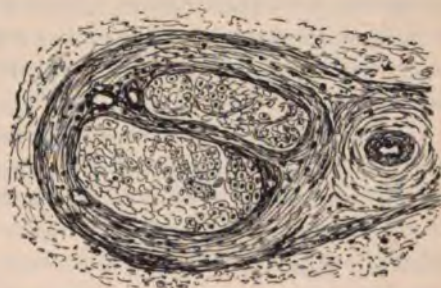


FIG. 106.—INTRAFASCICULAR NEURITIS IN CHRONIC FISSURE (Quénu and Hartmann).

Symptoms.—As a rule, patients can not say when the first symptoms of fissure begin. Occasionally one will recognize a time when during a difficult faecal passage there was a sensation of something giving way, after which there occurred a slight discharge of blood and recurrent pain at each stool. Such a history, however, is rare. Ordinarily he will state that for some time he has noticed either itching or burning after stool, accompanied with blood or mucus, and that he has a small pile which is either always swollen or which swells after defecation. The bleeding is generally confined to one or two drops, or simply a staining of the detergent material. The discharge of pus may not be sufficient even to soil the linen. Constipation will be complained of, but if one sifts the facts, it will be seen that this has been brought on more by the fear of pain following faecal movements than by any inactivity of the bowels; it is an acquired habit rather than a functional disease. In the beginning the patient could and would have had regular movements of the bowels had it not been for this fear of pain; there is in most cases absolutely no obstruction to the faecal passages, and in the early stages no lack of moisture and lubrication in the intestinal canal; it is simply a matter of voluntary control. The result of this is that the faecal passages become more and more dry the longer they are retained. They are thus made harder and more irritating, and finally when a movement does take place, the irritation is much more severe than it would have been had regular movements occurred, and the injury to the fissure or ulcerated membrane is greater.

Pain.—The pain associated with fissure is very variable in time, nature, and duration. It may come on at stool, immediately thereafter, or half an hour to an hour later. It may be acute, cutting, tearing, as if a wound were being pulled asunder, or it may be a burning, hot, irritating feeling accompanied with spasm and bearing-down sensations. Finally, it may have none of these characteristics, but assume a dull, heavy ache, with throbbing and distress similar to an aching tooth. The time which the pain lasts is also as variable as its nature. Sometimes it lasts for only a few minutes, and the patient is then able to go about his business without any further disturbance until the next stool. At other times the pain and smarting are so severe that he is unable to move from his position at the toilet, or must seek his bed, and lie there from half to three-quarters of an hour until the acute agony has passed away. After this he is comparatively comfortable for the rest of the day. In others still the pain does not come on for some little time after the faecal movement, when it begins to smart and burn, this sensation gradually changing into an aching, throbbing distress about the anus and sacrum, which condition may last for several hours, or

even in some cases all day long. Certain patients are never free from discomfort.

There is a pretty clear relationship between these pains and the character of the fissure. Those acute pains lasting for only a few moments are ordinarily due to superficial fissures which involve the uppermost layers of the muco-cutaneous tissues, heal partially or entirely from day to day, and recur with each hard stool. They can be produced by forcibly stretching the anal folds apart. Such fissures are frequently associated with atrophic catarrh and late syphilis. The pains which come on just after stool, and last for half an hour or more, are ordinarily due to an ulceration between the radial folds of the rectum, especially in the posterior commissure; there is a slight, red, granulated base, thickening of the edges, and a sentinel pile, or two little teats at its lower end. The dull, aching, throbbing pain which comes on some time after stool is generally due to a fissure or ulceration situated in the upper portion of the anus, and involves the internal and the upper fibers of the external sphincter. It is ordinarily of long standing, deeper and more indurated than the previous variety, but its edges are not so elevated and thickened, and it does not involve the skin at all, and can only be seen by the use of a speculum or forcibly stretching the anus apart. These late pains, occurring some time after a fæcal movement, indicate that the ulceration is high up, while those occurring immediately thereafter would indicate a lower situation. In general, however, it may be said that the acuteness and severity of the pain is in direct proportion to the nearness of the ulcer to the anal margin. The more of the muco-cutaneous tissue involved the greater will be the pain. The application of this is clearly brought out in the chapter upon Anatomy, where it is shown that the sensitive nerve-fibers approach the anus from below, and are distributed in a gradually decreasing ratio as we ascend into the anal canal, disappearing almost entirely after the mucous membrane has been reached.

Reflex Symptoms.—With the local symptoms of fissure a variety of reflex phenomena occurs, sometimes even more annoying than the fissure itself. Dysuria and painful urination are among the most frequent complications. The first case of fissure that the author treated was a man who complained of symptoms of urethral stricture, and who had been treated for the same for a long time without any material benefit. He was an orderly at the Blockley Hospital in Philadelphia, and close questioning revealed the fact that his urethral symptoms were always more marked at the time of and just after his fæcal passages, and that at periods the farthest removed from the stool he was comparatively free from his urethral symptoms. Examination of the man's rectum demonstrated the existence of a small indurated fissure at the anterior com-

missure of the anus. Incision of this soon resulted in its cure, and for two years thereafter the patient was absolutely free from any urethral or urinary symptoms.

It is not necessary, however, that the fissure should be in the anterior commissure to produce these reflex urinary disturbances, as proximity is not the cause. The origin of the nerve supply to both sets of organs being practically the same in the spinal cord, irritation of the nerve-ends in one is likely to be reflected in the other.

Uterine and bearing-down pains often occur as a result of fissure in ano. Backache and neuralgia shooting down the leg, indeed all over the body, may be the result of one of these nagging, irritable ulcers of the anus. These widespread and vague disturbances are, of course, due in a measure to the nervous exhaustion and strain produced by long-continued suffering and irregular action of the bowels. Facial and occipital neuralgia, spinal irritation, and temporary strabismus have been known to disappear almost immediately after operations for fissure; it is not asserted that the latter was the cause, but it certainly seemed to be.

Diagnosis.—The diagnosis of fissure is considered very simple. It is often made simply from the description of pains after stool, but patients have these from many causes; foreign bodies, stricture, chancre, gonorrhœa, syphilis, and eczema all produce them. While these symptoms are of the utmost importance, one should not make a final diagnosis without a careful local examination. This should be insisted upon in every case in which there are symptoms of rectal disease, and in none is it more important than in this condition; first, because mistakes in rectal diseases are likely to prove rapidly disastrous; and, second, because in this particular disease local treatment or operation is the only reliable means of cure, and therefore nothing can possibly be gained by delay.

To examine a patient for fissure, the semiprone position is the most convenient. The patient should be laid upon his left side, the hips elevated upon pillows, the thighs flexed upon the abdomen, and the left arm thrown backward, so that the trunk rests practically upon the breast. The buttocks should at first be pulled gently apart and the external surface of the anus examined. If there be a sentinel pile it can be easily recognized, or if the ulceration involve the perianal tissue it will also be clearly seen.

Palpation around the anus will not only reveal the hypertrophied and hardened condition of the sphincter muscle, but it will usually enable one to determine the probable point at which one may expect to find the cause of the pain. Pressure upon the margin of the anus always gives pain just below the site of an ulceration, even though the ulcer itself is not pressed upon. With the patient's assistance, pulling upward

upon the right buttock, while the surgeon pulls downward upon the left, the anus may generally be everted sufficiently to see any typical fissure or intra-anal ulceration. In women this may be facilitated by the introduction of the fingers into the vagina, and pressing backward and downward, so as to evert the rectum (Fig. 107). These maneuvers always occasion more or less pain in true fissure. Sometimes it will be so great that the patient can hardly stand an examination of this kind. The introduction of a small quantity of cocaine upon a pledget of cotton will occasionally relieve this pain, and enable one to examine the fissure without great disturbance. As a rule, however, cocaine is very poorly absorbed by granulating surfaces, and is often disappointing in these examinations. If the patient can be induced to strain, fissures between the radial folds can generally be brought into comparatively good view. Frequently, however, this effort brings on the typical pain of fissure, and he will be unable



FIG. 107.—EVERSION OF ANTERIOR FISSURE BY FINGER IN THE VAGINA.

to continue it. Under such circumstances, if one keeps at hand an insufflating apparatus containing finely powdered anæsthesine, and will blow on the fissured surface a small quantity of this drug, he will be able after a few moments to examine the parts in an almost painless manner. Occasionally this drug fails, but in many instances it affords great relief in the examination of ulcerating conditions of the anus.

Having thus seen what is possible upon the outside and lower portion of the anal canal, digital examination should be made to determine not only the existence of a fissure, but, if possible, its cause. The elevated and thickened edges, the indurated base, or the smooth, soft, circular ulcer just above the margin of the external sphincter, are easily recognized by the educated touch. Allingham states that at the upper

end of an anal fissure one often finds clavate papillæ or small polypoid growths which fall into the cleft, and thus prevent healing. He states that these growths are not the cause of fissure as a rule, but that they certainly keep the wound open and prevent its healing. His further statement, however, that when such growths are found it is not necessary to examine the rectum any further invites criticism. Assuming that he is right in his statement that these little neoplasms are not the cause of fissure, their discovery, therefore, will not have solved the etiological problem. One should not stop at this point, but carry his examination farther, and determine if possible whether there be any pathological or anatomical condition above this which will account for the ulceration.

In the introduction of the finger for the examination of fissure, it should always be pressed to the opposite segment of the anus from that at which one supposed the lesion to exist. Thus if the patient complains of pain in the posterior segment, the finger should be carefully pressed forward and introduced to its full length. The rectum should then be examined for any abnormalities, and the anus can be searched for ulceration as the finger is withdrawn. With the use of anæsthesine and these precautions very little pain is occasioned by such examinations. The ulcerations are largely within view by the separation of the radial folds, and, moreover, they can be so clearly and distinctly felt that their diagnosis is always certain. The small round ulcer of the anus is not so easily made out, and the speculum is of advantage to diagnose this condition.

The best instrument for the examination of these ulcers is the conical fenestrated speculum (Fig. 63). The segment of the anus in which the ulceration exists having been located by digital examination, the speculum should be introduced with one of the slides opposite this area. Where the sphincter is tense and hard, the smaller sized speculum should be used. After the instrument has been introduced to its full extent the slide should be withdrawn and the ulceration can then be clearly seen. The Sims's vaginal speculum is also very useful in these cases. The tubular specula and the anoscope are not useful in the examination of these conditions, inasmuch as they are very likely to clip out and give the patient a great deal of pain just as the ulcers come into view. Moreover, the conical speculum enables us to treat these ulcerations locally through the fenestra, the rest of the circumference of the anus being thoroughly protected from any applications which one may make.

Treatment.—The treatment of anal fissure is ordinarily described as palliative and curative. There is no place in rectal surgery for the palliative treatment of fissure. Opiates and sedatives which relieve the pain always increase the constipation and make the faecal passages not

only more painful but more injurious to the diseased condition. The treatment therefore resolves itself into the non-operative and operative methods. The first step consists in removing the cause if possible. For those cases due to constitutional syphilis, the line of treatment is laid down in the chapter upon Venereal Diseases.

In those cases in which a polypus or papilloma complicates the fissure it is useless to attempt local treatment without the removal of these neoplasms. Where it is due to constipation and atrophic catarrh, these should be treated along with the fissure, as the latter is sure to recur if these conditions persist.

The regulation of the bowels is of the utmost importance in children as well as in adults. When the movements are regular, but the faecal mass is hard and lumpy, an injection of a small quantity of sweet-oil and glycerin during the morning hours will generally afford great relief. This may be injected through a small syringe at a time somewhat previous to the usual period of defecation. One smooth, regular passage a day is better than an occasional purging. Allingham recommends for this purpose the use of figs soaked in sweet-oil, or onions and milk at bedtime. The use of figs as a laxative in rectal diseases is objectionable from the fact that the small seeds are not digested in the intestinal canal, and are likely to lodge in the ulcerated areas and cause irritation. Phosphate of soda given in the morning is sometimes effectual in the production of such faecal passages. Saline laxatives, sulphate of magnesia, sulphate of soda, etc., and the cathartic waters, such as Hunyadi, Friedrichshall, Apenta, and Rubinat, are more likely to produce frequent thin, liquid passages, which are irritating. Cascara with malt is quite satisfactory, but one must experiment with every patient to determine the amount necessary. The resinous cathartics, such as gamboge, podophyllin, aloes, etc., are all irritating to a fissured anus. Cripps thinks highly of a confection of black pepper and senna in equal parts, and recommends two large teaspoonfuls of this for an adult upon rising in the morning.

The diet should be carefully controlled, and if possible the bowels should be regulated by this means rather than by medicine. If there are hæmorrhoids, a cold enema in the morning will relieve the congestion in these, and ordinarily produce a satisfactory movement of the bowels.

Non-operative Treatment.—Where the fissure is acute and there is no marked induration of its base, it may be cured without any operative interference. The patient's constitutional condition should be built up, and as much rest in the recumbent posture as possible should be enjoined. Experience teaches that lying down immediately after faecal movements prevents in a large measure the pains of fissure. If there-

fore a patient's occupation prevents him from obtaining such rest during the morning hours, it is wise for him to regulate his bowels to move at an evening hour, so that he can go to bed and remain quiet afterward.

The injection of solutions such as starch-water and opium, iodoform and oil, and lead-water and laudanum after fæcal passages appears irrational and productive of no good; the only possible relief which they can afford to the fissure is through absorption, and their effect upon the nervous system; they do not come in contact with the ulcer, and add more irritation through the introduction of the syringe-tip necessary for their administration. If such remedies are necessary it would be better to administer the opiate hypodermically or by the mouth.

Cripps recommends an ointment composed of ferri subsulphate, 10 grains, and unguentum petrolii, 1 ounce. In some patients this ointment gives pain, in others he says it is very beneficial. He also recommends the application of a small amount of the following ointment to the fissured spot a few moments before the fæcal movement, and again after it has passed:

R Ext. conii	3ij;
Olei ricini	3iij;
Ung. lanolinii	3ij.

Allingham states that there is nothing better as a local application than the following ointment:

R Hyd. subchlor.	gr. iv;
Pulv. opii	gr. ij;
Ext. belladonnæ	gr. ij;
Ung. sambuci	3j.

M.

Ointments containing cocaine, bismuth, iodoform, aristol, resinol, etc., and sometimes a certain amount of morphine, have been highly recommended by various authorities. As a rule, however, they are not of much benefit, save the ointment of conium, recommended by Cripps. Recently, however, the author's treatment of fissure in ano has entirely changed so far as local applications are concerned. It is no longer a question as to the length of time a fissure has existed, whether it is curable by local treatment or not; the condition of the sphincter and the amount of induration, together with the depth to which the ulceration has extended, are the important factors. If the sphincter is hypertrophied, hard, and spasmodically contracted, if the ulcer is deep and indurated at its base, with its edges thickened and the sentinel pile well developed, one can not generally succeed in curing the condition without some operative interference. Especially is this true if the muscular

fibers are exposed and can be clearly seen by the use of a magnifying glass. Where, however, these conditions do not exist one may confidently predict a cure without any operation. The treatment consists in the application, first, of small quantities of anæsthesine insufflated on the surface of the ulcer; after a few minutes a pledget of cotton soaked in pure ichthyol is applied; these applications are made through the conical speculum, as was described above. The treatment is carried out every other day, together with the regulation of the bowels. The introduction of the speculum serves to gradually dilate the sphincter and takes the place of bougies. It is now some five years since this treatment was commenced, and during that time not more than 10 cases of uncomplicated fissure have been seen, which could not be cured without operative interference. In the beginning of this method of treatment anæsthesine was not known, and solutions of cocaine were used to relieve the pain. Sometimes this was efficient and sometimes not. In those cases in which cocaine was ineffectual the patient suffered considerable pain after the first two or three treatments, but it gradually grew less and less at each succeeding one until the ulcer entirely healed. In the meantime, however, the fæcal passages always became less painful after the first application, and the patients have always been willing to bear the pain of the application rather than to submit to the knife. When there has been much spasm of the sphincter the parts may be smeared with an ointment composed of

℞ Ung. stramonii, }
 Ung. belladonnæ, }āā ʒiv.
 Ung. hyoscyami, }

M.

This always seemed to relieve the spasm and control in a large measure the pain that resulted from the application of the ichthyol. After the use of anæsthesine this ointment is rarely necessary. Whenever a hypertrophy of the sentinel pile exists or there are little teats, they should be cocainized and snipped off with scissors.

The average length of time consumed in the treatment of fissures by this method has been something less than four weeks, but in the majority of acute cases relief is obtained in ten days to a fortnight. In a large number of cases three or four applications of the ichthyol have resulted in a complete cure. Where the treatment is not successful within four weeks it is advisable that the patients submit to operative interference. At the same time, where the condition is complicated by hæmorrhoids or neoplasms of the rectum, such as polypi, adenomata, or papillomata, local treatment will be of little avail, and the method will be brought into disrepute by its application in such cases. Operative

treatment should therefore be resorted to at once under these conditions.

The author's experience entirely agrees with the statement of Allingham, that lateral and anterior fissures can always be healed without operative interference; but that fissure, with induration and hypertrophy of the sphincter, is always sure to recur when healed in this manner.

Nitrate of silver in solutions of from 2 to 50 per cent, and sometimes in the solid stick, is a useful remedy. It stimulates sluggish ulcers, destroys exuberant granulations, and forms a coating of albuminoid of silver over the lesion, which protects it from irritation by the fæces. Occasionally it relieves the pain after one or two applications, and accomplishes rapid healing. This, however, only occurs in shallow, uncomplicated fissures. The other chemical cauterants are not so good. Painting the ulcer over with iodoform, 10 per cent, and flexible collodion, 90 per cent, will sometimes give great relief. The parts should always be held apart until the ether in the collodion thoroughly evaporates, otherwise it will give great pain and blister the surrounding parts. Recent experiences indicate that a 25- to 50-per-cent solution of argyrol will prove one of our best local remedies in fissure. The treatment by ichthyol, however, is the most satisfactory.

Operative Treatment.—The operative methods for the treatment of fissure comprise dilatation, incision, and excision. Incision and excision are probably both older methods than dilatation, and yet perhaps at the present day the large majority of fissures are treated by forcible dilatation. This method is usually credited to Recamier, but upon investigation it was found that his method was not that of forcible dilatation at all, but rather, as he calls it, a "*massage cadence*." It consisted in introducing the fingers into the anus and grasping the sphincter muscle with the thumb outside, and in this manner carrying on a massage all around the sphincter until, as he claims, it became softened and less spasmodic. The results of this method are not clearly laid down in literature, but shortly thereafter Maisonneuve (*Clinical Chirg.*, t. ii, 1864) advised and practised forcible dilatation. His method consisted in introducing one finger after another into the anus until the whole palm of the hand passed through the sphincters, then doubling the fingers up he further distended the parts with his fist until complete relaxation of the sphincter was obtained. At the time of Maisonneuve's operation anæsthesia was little known, and such a method was not likely to become popular on account of the extreme pain it produced compared with the simple operation of incision which Boyer had introduced many years before.

The other method of dilating the sphincter, as has been described in the chapter on Hæmorrhoids, consisted in introducing the thumb of each

hand through the anus, and with the fingers upon the tuberosities of the ischii, dilating the sphincter thoroughly from side to side, and then with the fingers upon the pubis and coccyx gently stretching it antero-posteriorly. This procedure should be done slowly and gradually for four or five minutes, stretching the parts in all directions until the muscle becomes so flaccid and loose that there is little tendency to recontract.

There have been a good many theories advanced with regard to the process by which dilatation relieves the pain of a fissure. Some hold that it is entirely due to overcoming the spasm of the sphincter, arguing that the suffering which patients endure is caused not by the ulcer itself but by the muscular contractions which squeeze and irritate the exposed nerves. Others hold that the relief is occasioned by the stretching of the nerves, and is comparable to that which is seen to follow stretching the nerve in cases of sciatica. Still others hold that the relief is occasioned by the subcutaneous and superficial hæmorrhage in such cases acting as a depleting, antiphlogistic agent to the local congestion. Recent experimental studies in this line seem to indicate that it may possibly be due to the reflex effect upon the spinal center due to temporary traumatism of the nerve-ends. What is exactly accomplished by stretching is not clearly understood. Experiments recorded by Allingham, and repeated upon dogs by Hartmann, demonstrate that by stretching, the muscular fibers are not broken nor are their fibrous attachments anteriorly or posteriorly severed. There are no hæmorrhages in the muscular tissue itself, and there appear to be no alterations in the nerve-ends. The base of the ulcer is deepened, but it is impossible to suppose that by this means alone a healthy ulcer can be established; if, in short, the ulceration is due to infection of a traumatic lesion, this infection will still be operative after, as it was before the stretching. The operation can not change the nature of the ulcer. Hartmann's conclusions are that the relief obtained by forcible dilatation is due to the production of "a reflex atony of the sphincters." The fact that the muscles soon regain their tonicity is opposed to this view. It appears more probable that the relief is due to the fact that by the forcible stretching, the nerves which are caught and held by inflammatory processes are torn loose from these attachments, released from their embrace, and also from the squeezing consequent upon sphincteric contraction. This, like all the other theories, is purely hypothetical. The fact that incision relieves the pain quite as promptly would indicate that the effect was due to disabling the sphincter temporarily.

Some surgeons dilate the sphincter with divulsors, such as those of Sims, Thebaud, and Worbe—that of Mathews is one of the best. In cases in which there is a very strong sphincter a Van Buren or Sims's

vaginal speculum will be found to be helpful, but instruments are rarely necessary in this operation.

In the face of the preponderance of testimony as to the curative effect of forcible dilatation in fissure, the author is compelled to state that his experience does not corroborate the opinions of the majority of writers upon this subject; he has not only had it fail in his own operations, but he has seen a large number in whom the operation had been practised by other surgeons without success; at least the fissure returned within a short time afterward. It is needless to say that in those cases where there is a polypus at the upper angle of the fissure, stretching alone will not cure the condition. It is necessary to remove the complicating tumor. Sometimes it is overlooked, and this explains the failure. The same may also be said of sentinel piles at the lower angle of the wound. But laying these cases aside in which the operation may be said to have been incompletely done, there are still others, especially at the posterior commissure, in which stretching does not result in a cure. Where there is considerable induration and hypertrophy of the edges of the ulcer, stretching, while it relieves the pain for the time being, will not result in a permanent cure, owing to two facts: First, these hypertrophied edges fold inward and interfere with healing; second, the fissure is practically seated upon fibrous tissue at the juncture of the muscular fibers as they come together to form a sort of tendon behind the anus, and these fibers are simply separated by the stretching and not torn or paralyzed. The result is that the infolding edges prevent rapid healing, and the muscles, speedily regaining their power, reproduce all the old symptoms.

In such conditions the edges should be trimmed off and the muscle incised, as will be described presently. There is a difference among writers with regard to the class of cases in which dilatation should be practised. Allingham states that it is the safest method in old people, and in tuberculous and vitiated constitutions. Mathews, on the other hand, states that the operation should be avoided in such cases. To one who has had very much experience in operations upon old people two facts are prominent: the first is, that these individuals do not recover muscular tonicity with any degree of certainty; the other is that they all bear suppurative diseases very poorly, whereas in aseptic conditions their tissues unite in a most satisfactory manner (Tuttle, *Operations on the Aged*, Journal of the American Medical Association, vol. i, 1901). With these facts in view one can realize that the operation of divulsion may easily result in incontinence in these individuals. On the other hand, incision may cause suppuration and death from exhaustion. It will be better in such cases to adopt a method by which both of these dangers can generally be avoided—i. e., *excision with immediate suture*.

In cases of phthisis the fissure is very likely to be tubercular in its nature, and incision and stretching are both undesirable. If the lesion can be thoroughly excised, and the edges sewed together, it is perfectly proper to do so. If not, these wounds had better be treated by the actual cautery or by local applications. Where the fissures are multiple, forcible dilatation is always advisable; and in children who do not bear local treatment patiently, this method is exceedingly successful, except in those due to syphilitic disease.

Results of Dilatation.—At the time of dilatation there is always some hæmorrhage, but it is never alarming. If carefully and slowly done there will be very little tearing or traumatism of the parts; there is always an extravasation of blood into the cellular tissue around the anus and a consequent discoloration and congestion for a few days following. Experiments have shown that there is no extravasation of blood in the muscle, no rupture of its fibers, and no laceration of the fibrous rhapshe (Quénu and Hartmann, p. 444). The length of time during which the paralysis of the muscles lasts is variable. If one will examine the anus of a healthy adult patient after it has been divulsed, he will find that within an hour following the operation there is no longer any gaping, and stimulation to the muscle will produce a certain amount of contraction. This contraction continues to increase until within twenty-four to forty-eight hours the patient will have regained considerable sphincteric control, and at the end of seventy-two hours ordinarily, complete sphincteric action will have returned. Even within a few hours spasmodic twitching is resumed in most cases. The idea that the sphincter remains paralyzed for a sufficient time for the ulcer to heal is not borne out by facts.

If the healing of the fissure depends upon the maintenance for a certain length of time of the paralysis of the sphincteric contractions, the question arises whether it is not wise to introduce into the rectum either a firm plug or bougie, and maintain it there for a few days, so that by long-continued stretching this paralysis will remain more permanent. This method is employed by many surgeons after operations on hæmorrhoids, and the author has used it with good effect in fissure. The Pennington tubes serve excellently for this purpose; by wrapping with gauze the plug can be made any size, and the rubber covering prevents the granulations becoming caught in the meshes, and thus torn when it is taken away. The tube is best introduced through a bivalve speculum, and held in position by a safety-pin attached to a T-bandage. By this means the dilatation of the sphincters is maintained, and, strange to say, after forty-eight hours the patient feels more comfortable with the plug in place than he does with it out.

Unquestionably this prolonged dilatation hastens recovery and makes

the faecal passages at first much easier. It is advisable in any case of severe fissure operated upon by the method of dilatation. Permanent incontinence has been seen to follow divulsion of the anus, and a loss of sensation that indicates the approach of faecal or gaseous passages is not at all infrequent. The author has had two patients in whom this operation has been followed by unconscious stools at night, requiring them always to wear a napkin.

Method of Incision.—The second method of operating in anal fissure consists in an incision through the base of the ulcer. This method was first advocated by Boyer in 1788, and since that time has been described under his name. Boyer, holding that the fissure was due to spasm of the sphincter, advised complete section of that muscle in order to absolutely control this spasmodic contraction. So far as can be learned, he did not advocate cutting through the base of the ulcer at all, but even sometimes made a section of the muscle upon either side of the rectum, thus completely paralyzing it. The fact that these operations, which did not affect the ulcer *per se*, resulted in immediate relief of the painful symptoms, and a cure of the fissure lends color to his theory. He also introduced a hard bougie surrounded with charpie, and thus kept up continuous dilatation. Following him, others thought that it was not necessary to incise so deeply, holding that it was only the superficial fibers that kept up motion in the ulcerated surface and thus prevented healing.

Mathews, even as late as 1895, advocated scarifying the fissure with the edge of a knife instead of cutting the muscular fibers, and claimed that he obtained just as good results. Among those who believed in the superficial incision may be mentioned the celebrated Dupuytren, Curling, and Copeland. The latter even held that an incision into the mucous membrane alone was sufficient to cure a fissure. But unfortunately the majority of these ulcers has already passed beyond the depth of the mucous membrane and invaded the submucous tissue, sometimes even the muscular fibers, and therefore this operation will not suffice.

The depth of the incision and the point at which it should be made are of the utmost importance. It should be deep enough to put the muscle thoroughly at rest. It should also be made through the ulcer, for otherwise it would produce a site for infection and possibly a second fissure. This applies to ulcers which are not directly in the anterior or posterior commissure. In these cases it is only necessary to refer for a moment to the anatomy of the region to see that an incision directly in the posterior commissure would not sever the muscle. The fibers of the external sphincter unite in a sort of tendinous prolongation at the posterior commissure. They do not decussate to any marked

degree, but proceed parallel with each other back to their insertion in the coccyx. An incision therefore directly back to the tip of the coccyx will result in the separation of most of these fibers and the cutting of very few. This will not put at rest the muscular contraction, and therefore it will fail in fissure directly in the posterior commissure. Moreover, those fibers which are severed by the incision will be cut at an oblique angle, which is always slow to heal and forms an irregular cicatrix which is not conducive to the best functional action of the muscle. Thus it will be seen why in these cases operations by divulsion and incision have both failed. In the one the muscular fibers are disabled for a short time and separated by the force of stretching, in the other the fibers are simply separated by the edge of a sharp knife, which may cut a few, but by no means enough to paralyze the action of the muscle. The experiments of Quénu and the other Parisian surgeon, whom Allingham quotes but does not give his name, are very important with regard to the observations upon this point. They say that there is no rupture of the muscular fibers nor of the tendinous fibers. Therefore their contractility returns very soon.

All this digression derives its importance from the fact that it explains the failure of the commonly accepted methods in the treatment of a great many cases of fissure. Those at the commissures should be treated by incision, and this should be made on one side or the other in order to sever the muscles and put them at rest. The V-shaped incision (Fig. 108) serves excellently in these cases, because it puts at rest the fibers of both sides over which the ulcer is situated. It also cuts them squarely across, thus conducing to a small cicatrix. By this incision many cases can be promptly cured which are rebellious to the ordinary cuts and to divulsion. It succeeded in one case in which these methods had been tried five times and failed.

Length and Depth of Incision.—The length of the incision should be a little greater than the ulceration, starting above it and ending slightly below it. The depth of the incision should extend about a quarter of an inch deeper than the deepest portion of the ulcer. These are the only safe guides.

As Allingham points out, there is much more danger of failing to cure a fissure by too superficial incision than there is of incontinence



FIG. 108.—V-SHAPED INCISION FOR FISSURE AT THE POSTERIOR COMMISSURE OF THE ANUS.

from a single deep incision at right angles through the sphincter muscles. He says that if the incision is made squarely across the muscular fibers the ulceration will heal before these reunite, and when the union has been completed there will be a thin square cicatrix which will not interfere with the functional action of the muscle. If the incision be made at an angle the fibers will not entirely separate, they will unite too soon, and there will be a long, irregular cicatrix and permanent lengthening and loss of power in the muscle.

It is therefore better to carry the incision a little too deep than to take any chances of failure to cure the patient by too great a conservatism. A slight superficial cut will relieve the pain temporarily, but it does not paralyze the sphincter for a sufficient time for it to result in the healing of the ulcer and a cure of the fissure. If, however, the incision is deep enough to thoroughly divide the muscular fibers, they will retract and the ulcer will have abundant opportunity to heal before a sufficiently firm cicatrix has formed to enable the muscle to act.

The theory upon which this practice rests in cases of great hypertrophy of the sphincter muscle is that this section and retraction of the muscular fibers put them absolutely at rest until the cicatricial union between their ends gives them an attachment through which they can exercise their powers. At the same time this cicatricial interposition lengthens their attachment and thus decreases their contractile power. Thus a temporarily complete rest and the elongation of the fibers through this interposition of the cicatrix brings about a partial atrophy of the muscle, restoring it, comparatively speaking, to its original state.

One great advantage of operation by the knife at the present day consists in the fact that general anæsthesia is unnecessary. In divulsion it is almost a necessity, but by the hypodermic injection of cocaine or eucaine it is possible to incise any case of fissure absolutely without pain beyond the slight prick of the needle for the introduction of the drug.

The strength of the cocaine solution to be used may be from 1 to 4 per cent. The infiltration method of Schleich is not only painful but uncertain, especially where there is any amount of inflammation and infiltration of the parts. A 2-per-cent solution of cocaine or a 4-per-cent solution of eucaine is upon the whole the most satisfactory. Five or 10 minims of the cocaine solution, if slowly and carefully introduced, will anæsthetize almost any anal fissure and enable us to incise the muscle and scrape out the fissure without any pain. It is necessary in these cases to use the finest hypodermic needle. First, in order that the minimum amount of pain may be occasioned by its

introduction; and second, in order that the amount of the fluid used may be so slowly injected that it will disseminate itself over a large area. Recent experiments with medullary anæsthesia show what a powerful influence minute quantities of a weak solution have when applied directly to the nerve-centers or to the nerve-tissues themselves; so that in these operations it is only necessary to bring the smallest quantity of the solution into contact with the nerve-ends or the nerve-trunks in order to completely anæsthetize the parts. The best practice is to introduce the needle through the healthy skin just below the fissure, and by this one puncture to carry the cocaine beneath and upon each side of it in order to bring the drug in contact with the nerve-trunks and nerve-ends supplying the diseased area. After the cocaine has been injected for two or three minutes, a Sims or Van Buren speculum can be introduced and the exact location and the extent of the ulcer seen. A competent rectal surgeon ought to be able to tell this by digital touch; but the addition of the sense of sight and the accuracy with which work can be done which is clearly in view, compared with that done only by touch, can not possibly be of any disadvantage to the most expert surgeon, and it is an absolute necessity to those who only operate semioccasionally.

If there be any proud flesh or exuberant granulations in the ulcer they should be scraped out with a sharp curette or a Volkmann spoon. After this the incision should be packed thoroughly with a small strip of iodoform or sterilized gauze and the patient kept in bed for forty-eight hours. This injunction with regard to keeping the patient in bed makes the author liable to the charge of inconsistency between practice and teaching in the eyes of many of his old students, for they well know that more frequently than otherwise he operates upon these cases of fissure in his clinic, allows them to get up and walk home an hour or so afterward, and to resume their work upon the following day. Many of the students have seen case after case return at the next lecture absolutely free from pain and grateful for the relief afforded them. Nevertheless, in private practice, it is not wise to take the chances which one takes in clinical work. Many of these patients in the clinic depend upon their daily labor for food and support for their wives and children, and it is of the utmost importance that they keep about in order to retain their positions. As a consequence the majority of them would refuse to have anything whatever done which entailed the necessity of their laying up from work. Thus while the operation upon walking cases is not a method of choice, it is justified by the necessities of the case. The results of this practice are sufficient answers to the claims of French surgeons that the method of divulsion requires less bodily confinement than that of incision. The effect of

general anæsthesia itself detains a laboring man from his work longer than a whole operation by incision. Moreover, the latter causes no traumatism, contusion, or extravasation of blood into the cellular tissues, as does forcible dilatation.

The dangers of hæmorrhage into the cellular tissues following forcible dilatation are not to be ignored, as will be seen from the cases described in another portion of this work (see chapter on Hæmorrhoids). It is needless to say that in the operation by incision all sentinel piles, polypi, papillæ, or hypertrophied edges of the mucous membrane which fall down into the fissured tract or ulcer should be removed at the same time that the muscle is cut. Unless these precautions are taken no operation, whether by incision or dilatation, will prove successful.

Other methods of incision have been advised. Hilton advised passing a sharp-pointed bistoury beneath the external sphincter muscle and cutting upward through the ulceration. Demarquay (*Archiv. gén. de méd.*, 1846, p. 377) advocated the submucous incision of the muscle. By this method a bistoury is passed from the margin of the anus upward beneath the mucous membrane and ulceration as far as the ulcer extends, and the sphincter is then cut outward until relaxation is produced, as is done in the subcutaneous operations for contracted tendons. As Ball states, however, this operation and that of Copeland could only be applied to those cases in which the ulceration was very slight or in which there was no ulceration at all, but simply a congestion, in which case no operation is necessary.

Allingham calls attention to the necessity of restoring any malformations of the uterus before attempting operative procedure for fissure in women. He also lays great stress upon the necessity of keeping them in bed after whatever procedure is adopted whenever there is any uterine or vesical disease. This advice is certainly wise, and needs only to be mentioned to be appreciated.

Excision of Fissure.—In our discussion of the pathology and etiology of fissure, attention has been called to a class of cases in which there is marked induration and cicatricial formation at the base. It has been stated that in a certain number, although the ulcer was completely healed, the patient still suffered from pains of a dull, aching, neuralgic character about the rectum. These facts were explained by the histological studies of Hartmann, which demonstrated that these patients not only suffered from an ulceration of the anus but also from a perineuritis in the deeper tissues below the ulcer, and that neither stretching nor incision was absolutely sure to relieve this condition. Having seen a number of such cases upon which divulsion and incision had proved failures, the author concluded some three years ago

that it would be wise in such cases to dissect out the indurated mass at the same time that he either stretched or incised the sphincter. Up to the present time he has operated on 7 patients. In 4 the fissure was uncomplicated, and after dissecting out the indurated mass and incising the sphincter, the freshened edges of the mucous membrane and skin were sutured over the site of the ulcer. In 3 of the 4 cases primary union took place and the patient was absolutely well at the end of one week. In the fourth case infection took place and the stitches had to be removed upon the third day. The healing was somewhat protracted, but the pains were entirely relieved, and the patient made a good recovery at the end of about five weeks. In the other 2 cases in which the dissection was done the fissure was complicated with hæmorrhoidal disease. In one of these the modified Whitehead operation was performed after dissecting out the cicatricial tissues about the fissure and incising the sphincter muscle upon each side as illustrated (Fig. 108). In this case the result was ideal, both in regard to the hæmorrhoids and the fissure. Primary union took place all around the anus, and at the end of ten days the patient left the hospital perfectly well.

In the sixth case, in which the excision of the fissure was made, the clamp-and-cautery method was used for the removal of the hæmorrhoids and left the fissure wound open to heal by granulation. The patient suffered considerable pain following the operation, lasting for about five days. He was a hyperæsthetic individual incapable of suffering patiently, and was in the habit of taking opiates for relief. In his case, therefore, it was necessary to administer numerous hypodermics of morphine; but after five weeks the parts were healed, and he has never had any return of his old pains, has entirely discontinued his use of drugs, and he is now attending to his practice, which he had practically given up on account of his fissure. Such a limited number of cases is too few from which to draw any broad conclusions. The results, however, would seem to justify a wider application of the principle in all cases in which the dull, aching pain following fæcal movements indicates the involvement of the deeper nerve-trunks in a process of perineural inflammation. The possibility of specific taint, even in the most innocent, has led in all cases in which a fissure has existed for many months to giving the patient moderate doses of mercury and iodide of potash, even though no other manifestations of the disease were present. In 2 cases in which the fissure had already been incised by other operators and had not healed, the ulcer was cured by local applications together with the administration of this mixed treatment. Whether it affected an obscure, constitutional syphilis, or acted by its tonic and alterative effect, it is impossible to say. The necessity of

constitutional treatment in cases with tubercular and anæmic tendencies should not be overlooked.

One other feature which has afforded considerable satisfaction in some of these cases has been the recognition of rheumatic or gouty symptoms elsewhere in the body; these influences may also assume considerable importance in the neuralgic and aching pains of fissure. Wherever this constitutional tendency exists it is well to put the patient upon nitrogenous diet and administer some anti-rheumatics, such as salicylates combined with alkalies; Turkish baths at regular intervals will also be useful in order to keep the skin and kidneys active.

In conclusion, it may be said that while divulsion will be successful in the majority of cases in which the fissure is laterally located, and in which there is no considerable induration and neuritis, it is by no means an absolutely sure method for the treatment of fissure. Simple incision is more certain, and will result in a cure in the large majority of cases. It has the advantage that it does not require general anæsthesia, being done under the influence of cocaine, and it maintains the relaxation of the sphincter muscle for a much longer period than is accomplished by the method of dilatation. Moreover, where the ulcer is situated above the external sphincter it furnishes complete drainage and avoids the accumulation of pus and faecal matter in the depression caused by the ulcer. This method is not always successful in cases with marked induration; in those the method of excision is the safest and surest so far as rapid and complete cure is concerned; and this also may be done under cocaine.

Many of these cases are complicated with hæmorrhoidal disease, and the operation upon the fissure will be determined by the method selected for the operation upon the hæmorrhoids. If an open operation, such as ligature, crushing, or the clamp and cautery is chosen for the hæmorrhoids, it will be useless to attempt to suture up the wound made by excision; but if the Whitehead operation is adopted for the hæmorrhoids, then the edges of the fissure wound should be closed at the same time.

Submucous Fissure.—There is said to be a number of cases in which the symptoms of fissure are associated with no local lesions that can be made out by either digital or ocular examination. A case of this type has been described elsewhere in the chapter on fistula. It is not a true fissure, but a small submucous fistula due to ulceration and burrowing downward from one of the crypts of Morgagni. There is very little pus, apparently no induration, and yet the patient suffers at and after every stool just as in cases of acute, uncomplicated fissure in ano. It can be diagnosed by the introduction of a bent probe into

one after another of the crypts; when the diseased crypt is reached a very acute pain will be excited. An incision of the mucous membrane overlying this little fistulous tract is not sufficient to relieve the condition; after laying open the fistula the sphincter muscle should be incised throughout the extent of the tract and to the depth of about a quarter of an inch below its surface. This will relieve the fissure-like pain and in a short time radically cure the trouble. This condition is rare, but it is very distressing to the patient and puzzling to the surgeon.

The Complications of Fissure.—Fissure is subject to the same complications as all other ulcers around the margin of the anus and within the anal canal. Acute inflammatory processes may set up from infection of the ulcer due to its being torn open afresh by hard fæcal passages, and there may be a cellulitis, a phlegmonous abscess, or a fistula as the result. Such an accident may also follow operations by incision or divulsion. It is necessary, therefore, to call attention once more to the necessity of antiseptic precautions in all operations upon the rectum. Admitting that it is impossible to produce absolute asepsis here, it is all the more imperative that it should be attained as nearly as possible. If the rectum is thoroughly cleansed at the time of an operation, and the wound is packed with sterilized gauze, this will generally protect the freshly cut surfaces in a filter-like way until healthy granulation has been established. Where there is already sepsis present in the parts, it may be advisable to use a Paquelin cautery in the cutting, in order that the lymphatics and blood-vessels will be sealed at the moment and thus prevent infection by whatever germs may be present in the wound or in the intestinal canal. This, however, is rarely if ever necessary in the treatment of simple fissure; and as it is likely, if used in severing the sphincter, to cause greater contraction of that muscle after healing, it should be employed with the greatest caution. Hæmorrhage has been said to result from fissure in ano. Undoubtedly such might possibly occur, as has been reported in the preceding pages, but as a rule the bleeding is only of a trifling nature, consisting in two or three drops of blood after fæcal movements.

Incontinence is said to have resulted from incision of the sphincter muscle for the cure of fissure; when this occurs it is due to the oblique incision of the muscular fibers. There are mentioned above 2 cases of incontinence following stretching of the sphincter muscle in elderly people. The author is of the opinion that as many cases of incontinence result from too rapid and too great divulsion of the sphincter as occur from single incisions.

Strictures of the anus and rectum have been said to result from the irritations of fissure. Prolonged and spasmodic contraction of the

muscle is said by Cripps to cause abnormal shortening and fibrous degeneration of the muscle, and to result in true stricture upon the level of the external sphincter, or more particularly in that portion of the rectum and anus surrounded by the levator ani. The facts which he states are plausible, and we must admit the possibility of such a result. But this admission only emphasizes the necessity of early and radical treatment of all ulcerations and fissures about the anus.

CHAPTER X

PERIANAL AND PERIRECTAL ABSCESSSES

THE tissues surrounding the anus and rectum are subject to frequent inflammations on account of the vast amount of cellular substance, the profuse blood supply, and the numerous lymphatics of this region. This may be brought about by extension from rectal and anal inflammations, by obstruction to the circulation, by the inoculation of septic materials through some of the glandular tracts, or by the deposit of these agents from the blood or lymphatic circulations.

Through variations of pressure due to the presence or absence of faecal masses in the rectal ampulla and to changes of posture, the circulation of the parts is at times greatly impeded, and at others absolutely free. The influence of these variations in the production of inflammatory processes about the rectum was referred to by Esmarch many years ago. The constant presence of infectious bacteria in the rectum and the functional action of the organ absorbing fluids from the faeces render it always possible for these agents to be taken up by the lymphatics and small blood-vessels and lodged in the perirectal tissues. That which interests us, therefore, from a pathological point of view is first, the character of the pyogenic bacteria, and secondly, the nature of their invasion.

Recent bacteriological studies have thrown considerable light upon the infectious agents in suppurating processes. We have learned to distinguish by microscopic examination between the various kinds of pus discharged from abscess cavities, and to base our prognoses largely upon the known phenomena of these different pyogenic agents. Among the bacterial contents of perirectal abscesses the tubercle bacillus is frequently present. Koch has stated that tubercle bacilli are never found in the rectum unless there exists a tubercular ulceration of the intestines. Sormanani, after a prolonged examination and study of the subject, attempts to explain the absence of tubercle bacilli in the faecal discharges upon the grounds that these bacilli are destroyed by the action of the gastric juice and therefore disappear in their passage through the stomach. His examinations, however, simply showed the

general absence of tubercle bacilli in the faecal discharges, and his explanation of this absence was purely theoretical. On the other hand, von Jaksch and others have succeeded in finding the tubercle bacilli in the stools of patients not affected with intestinal ulceration; and Carrière (*Compt. rendus soc. biol.*, 101, p. 1098) has shown by elaborate and patient experiments that exposure of tubercle bacilli to both natural and artificial gastric juice for twelve hours or more has no effect upon their virulence. Simmons (*Münchener med. Woch.*, 1900, p. 317) has demonstrated that while the gastric juice prevents the multiplication of tubercle bacilli, it in no wise destroys them, and after this secretion is neutralized by the alkaline fluids of the intestine, the bacilli may go on and develop just as if they had never been exposed to the gastric fluids. From these experiments there is no longer any doubt but that the bacilli reach the sigmoid and rectum through the digestive tract independent of ulcerations higher up in the intestine.

It is no unusual experience to find a tubercular abscess at the margin of the anus or in the perirectal cellular tissues, as the first manifestation of tuberculosis, and it is unreasonable to suppose that the bacillus enters through the respiratory apparatus and passes through the lungs into the circulation, and then lodges in this particular spot when it is possible to take a shorter and more direct route through the intestinal canal. How it enters the canal in cases with tuberculosis of the nares, throat, and lungs, is very easily explained by the fact that these patients often swallow the discharges and sputa. The bacilli may be carried to the parts by patients handling handkerchiefs or objects which have been used by the tuberculous, and thus cause local infection; it is also possible that the use of syringe-tips, bougies, and other rectal instruments which have been used upon tuberculous patients, may carry the germs and deposit them upon non-tubercular patients. Whether it is possible for these germs to be carried by detergent substances, clothing, etc., or wafted through the air, is a question for bacteriologists to decide. The fact, however, remains that we do have tubercular abscesses and ulcerations around the anus, and sometimes in the rectum in cases in which there are no other tubercular foci. It is impossible to come to any other conclusion than that these are local infections, and that the bacilli reach the parts through the digestive tract.

The next most frequent infectious agent found in abscesses and inflammations about the rectum is the *Bacterium coli*. The fact that this bacillus is so often found in perirectal abscesses is not conclusive evidence as to its etiological influence. Pathologists tell us it is the cause of suppuration, that it passes out between the tissues in the same manner that the white blood-corpuscles and amoebæ pass from

the blood-vessels and invades areas at a distance from the intestinal tract. It is always present in the large intestine, and needs only the slightest injury of the epithelial surface to afford it an entrance into the tissues. Such lesions are frequent enough, and inasmuch as the bacillus is always present, the question arises why it sometimes forms abscesses and sometimes does not. Recent studies by Vaughan seem to point to a probable explanation of these facts. He stated that the toxic principle of the bacillus is enclosed in a capsule, and that it does not produce inflammation or toxic symptoms until this capsule is broken or dissolved. Ordinary alkalines have no effect upon this capsule. Normal gastric secretions will dissolve it and set the toxic principle free; and furthermore, he considers it possible that the blood serum may also have this effect. Therefore, when the bacillus enters into a tissue largely supplied with capillary circulation, its capsule may be dissolved, thus setting the toxic principle free and establishing inflammatory processes which eventuate in suppuration. Thus the fact that normal *Bacterium coli* is found in the discharge from an abscess does not prove that this is the cause of the abscess. If its capsule is intact it is probably innocuous. It is rarely found alone, but almost always associated with other pyogenic bacteria, such as the staphylococcus, streptococcus, and tubercle bacillus. Hartmann and Lieffring in a study (*Bull. de la soc. d'anat. de Paris*, 1883, pp. 69, 161, 517) on the character of bacilli found in perirectal abscesses, state that in 7 out of 10 cases they established the existence of tubercle bacilli. In 4 of these cases this bacillus was associated with the *Bacterium coli*. In only 2 cases out of the 18 studied were they able to find the *Bacterium coli* alone. Twice they found the *Staphylococcus aureus* in a pure state. In 1 case the microbe of tetanus was found, and in another staphylococci associated with *Bacterium coli* and saprophytes. In numerous examinations which have been made for the author of pus taken from abscesses around the anus and rectum, no case has been seen in which the *Bacterium coli* was not associated with either tubercle bacilli, streptococci, or staphylococci. Achard and Lannelongue (*Bull. méd.*, 1893, p. 73) have confirmed the observations of Hartmann and Lieffring by the report of a case of abscess of the margin of the anus, in the pus from which only the colon bacterium was found. Muscatello (*La réforme méd.*, 1891, p. 145) has also reported a similar case. In all cases, however, infectious germs of some kind have been found. We may therefore assume that the septic origin of perirectal abscesses is thoroughly established, and that the old theories of idiopathic, gangrenous cellulitis, and suppuration are no longer tenable.

Course of Infection.—The methods by which such infection gains an entrance to the tissues must therefore be studied in order to account

for the variations in character and course of these different types of inflammation. The first and most easily understood method is through some lesion of the mucous membrane or of the skin in these regions. Wounds or injuries to the parts from whatever cause may afford entrance to the infectious agents into the perianal or perirectal cellular tissues. The nature and depth of the wound sometimes govern the extent of the infection, but the character of the germ and the activity of the lymphatic and general circulation have much more to do with it. These lesions, while they account for the entrance of bacilli, do not furnish us any information as to the route that they travel in their invasion of the different perirectal tissues. There is a certain number of abscesses which involve only the skin or mucous membrane. In these cases the entrance of the bacillus is probably through some of the glandular organs of these teguments, such as the hair follicles, the sebaceous glands, and the solitary or Lieberkühn follicles.

These abscesses are nothing more than exaggerated furuncles, sometimes limited even to an acneous nature. The lymphatics of the skin may become involved in these cases, and through them an infection, which originally only involved a small glandular crypt, will invade a larger area. Such abscesses remain in this superficial lymphatic system and do not involve the deeper tissues of the ischio-rectal fossa or the superior pelvic spaces.

Eczema, herpes, abrasions from the clothing, and irritation due to improper detergent substances, may furnish an entrance to the infectious agents which are swept over the part during defecation. The course, however, is the same as that just described.

Other marginal abscesses occur as the result of thrombi or thrombotic hæmorrhoids. The question has been asked how infection enters through a thrombotic hæmorrhoid. If these little thrombi, due to the rupture of small veins around the margin of the anus, are examined, it will be seen that they are very close to the surface of the skin or the muco-cutaneous tissue. The tension produced by the extravasation of blood in the cellular tissue is quite considerable, and it is altogether possible that this tension may result in rupture of some of the sebaceous or hair follicles in the deeper areas of the skin, thus affording whatever bacilli exist in these follicles or upon the surface of the skin an entrance into the subcutaneous tissue. On the other hand, pyogenic agents which circulate in the blood with impunity, when poured into a stagnant area may find a congenial menstruum in which to multiply, and thus produce infection. Necroses from pressure or rupture of the cutaneous or mucous glands are probably the routes of infection in most cases.

Desprey formerly accounted for marginal abscess upon the theory

of suppurating phlebitis, but that disease is always accompanied by serious constitutional symptoms, and in these cases such are absent as a rule. As to the entrance of bacilli into the deeper perirectal tissues, certain cases may be explained by the perforation of the rectal wall either by foreign bodies, such as pins, fish-bones, syringe-tips, or occasionally by ulcerative processes in the mucous membrane. It is hardly reasonable to suppose that infections originating in this way could produce abscesses not connected with the rectum, and yet it is undoubtedly a fact that a large number of these perirectal abscesses have no connection with the rectum in the beginning. That they eventuate in fistula is due in most cases to delay in operative treatment or to improperly conceived surgical procedures. It is believed that perforating injuries of the rectum and anal wall will account for only a very few perirectal abscesses.

The reader who has closely studied the arrangement of the lymphatics, as described in the chapter upon the anatomy of the rectum, will remember that the superficial vessels of this system which surround the anus pass forward through the perinæum to join the inguinal chain of glands, or backward to that behind the sacrum; the deeper ones pass through the ischio-rectal spaces to the hypogastric chain, and those around the rectum pass upward to join the sacral and vertebral ganglia. It has been proved beyond the shadow of a doubt that infection travels along the lymphatic tracts. It is not the veins or the arteries in which septic germs are found in angeioleucitis, but the lymphatic vessels. Septic infections of the extremities travel rapidly to the axilla and groin along the lymphatic channels. In the same manner infectious bacteria enter the perirectal tissues. It is not necessary that there should be a puncture or deep wound for this to occur. The lymphatics in the skin and perianal tissues travel in a superficial plane. Thus, infections which enter these, spread either toward the scrotum and groin or backward toward the sacrum. The lymphatics which originate in the submucous area and in the columns of Morgagni pass upward and outward through the muscular fibers of the rectal wall and into the cellular tissue which fills up the ischio-rectal and the retro-rectal spaces. These lymphatic networks anastomose with one another, although the currents flow in opposite directions. The limits of the extension of sepsis is explained by the formation of thrombosis or inflammatory obstructions in these channels, thus demonstrating one of the conservative processes of nature. When the infection is checked in this manner in one direction it may flow backward and progress in another. Thus an infection originating in the superficial tissues may be checked in its progress, and through the anastomosis may invade the deeper tissues and so produce a combination of the superficial

and profound infection. These facts with regard to the thromboses of lymphatic trunks have been established by the bacteriological studies of Metchnikoff and by the clinical observations of Chassaignac.

The fact that abscesses occasionally develop at a considerable distance from the anus, following minor operations for hæmorrhoids or fissure, can only be explained through this method of invasion. The lymphatic system which connects with those subtegumentary areas of the buttocks is that described as the middle hæmorrhoidal lymphatic system. The superior hæmorrhoidal lymphatic system connects with the gluteal tissues through the ischiatic notch and the obturator foramen; thus injuries in the anal canal are likely to be followed by abscesses either in the ischio-rectal fossa or in the cutaneous tissues of the buttocks, while those that occur in the rectum proper are very likely to be associated with abscesses of the retro-rectal space and of the deeper submuscular tissue of the thigh.

The etiological factors therefore in perirectal and perianal inflammations or abscesses are the various infectious germs which are found in the rectum and the lymphatic system which furnishes these germs a means of emigration into the surrounding tissues. "The richness of the subsphincterian lymphatic network, the bunches of lymphatic trunks contained in the columns of Morgagni, the frequency with which these lymphatics are exposed to openings by slight abrasions and become immediately contaminated, explain for us the frequency of abscesses of the anus" (Quénu and Hartmann, vol. i, p. 131).

A recent and scientific classification of perirectal inflammations by Quénu and Hartmann is so elaborate as to be confusing to the general student, however satisfactory it may appear to the specialist. They may be broadly classified as Circumscribed and Diffuse Inflammations; and under these the special forms may be arranged. A sort of tabular statement of this division is as follows:

Circumscribed inflammations or abscesses.....	<div style="display: inline-block; vertical-align: middle;"> <div style="display: inline-block; vertical-align: middle;"> <div style="display: inline-block; vertical-align: middle;">Superficial</div> <div style="display: inline-block; vertical-align: middle;"> <div style="display: inline-block; vertical-align: middle;">Tegumentary.</div> <div style="display: inline-block; vertical-align: middle;">Subtegumentary.</div> <div style="display: inline-block; vertical-align: middle;">Ischio-rectal.</div> </div> </div> <div style="display: inline-block; vertical-align: middle;"> <div style="display: inline-block; vertical-align: middle;">Profound</div> <div style="display: inline-block; vertical-align: middle;"> <div style="display: inline-block; vertical-align: middle;">Retro-rectal.</div> <div style="display: inline-block; vertical-align: middle;">Superior pelvi-rectal.</div> <div style="display: inline-block; vertical-align: middle;">Interstitial.</div> </div> </div> </div>
Diffuse inflammations.....	<div style="display: inline-block; vertical-align: middle;"> <div style="display: inline-block; vertical-align: middle;">Diffuse perirectal cellulitis.</div> <div style="display: inline-block; vertical-align: middle;">Gangrenous perirectal cellulitis.</div> </div>

The order of sequence ordinarily adopted by writers upon this subject is violated in this classification because the circumscribed inflammations are very much more frequent in occurrence and less serious in their nature; moreover, the diffuse variety may result from them.

Of the circumscribed inflammations, those which are below the

levator ani muscle are called *superficial*, and those above it *profound*. Of each type there are three varieties, according to the tissues or areas involved.

Superficial Abscesses.—The circumscribed superficial inflammations are tegumentary, subtegumentary, and ischio-rectal.

Tegumentary Abscess.—This is the simplest form of circumscribed perianal inflammation. They are due to infection of the follicular or glandular portions of the skin, and muco-cutaneous membrane about the margin of the anus. They may be very properly termed follicular abscesses. The term "tubereux," used by the French, descriptive of this form of inflammation, is very misleading, in that it is often assumed to ascribe a tuberculous etiology to the condition. The inflammation may be due to any one of the septic or infectious germs. It is a direct infection and not due to any lymphatic propagation. It may be brought about by irritation of the glands from chafing, horseback-riding, improper detergent substances, rough clothing, and scratching of the parts. Stout, well-fed, inactive individuals, not overly attentive to the hygiene of the parts, are very liable to this affection.

They develop as little furuncles or acneous pimples about the margin of the anus, varying in size from that of a bird-shot to a good-sized hazelnut. Their symptoms are identical with those of follicular inflammation of the skin elsewhere, beginning in a congestion followed by swelling of the follicle, which eventually opens spontaneously and discharges its contents either as a thin purulent fluid or as a necrotic mass called a "core." Occasionally these abscesses assume a graver type resembling a carbuncle. The inflammation or infection extends from one follicle to another until a large area of skin is involved which may open at several distinct places close to the mouths of the separate follicles involved. The final discharge, however, of a central necrotic mass shows distinctly the nature of the disease, notwithstanding the fact that it sometimes perforates the derma and invades the subcutaneous or submuscular tissues. This latter condition is a complication and not a part of the real tegumentary abscess. Patients generally describe these abscesses as boils. They may be single or multiple, and sometimes one succeeds the other until the patient's life is made miserable by their continued presence around the margin of the anus. As a rule they do not involve the anal canal itself, but are limited to the cutaneous tissue about the margin. They do not therefore interfere seriously with defecation, and are not the cause of any functional derangements of the intestinal canal. They interfere with sitting or walking, and may necessitate confinement to bed for greater or less periods of time simply on account of the discomfort produced. There are usually no constitutional symptoms such as chill, fever, and loss of

appetite, although the temperature may be elevated a degree or more. It is a localized disease.

In a neighborhood so richly endowed with lymphatics both of the deep and superficial channels there is always a possibility of septic germs being taken up from any focus and carried to other regions and infecting them. These little abscesses are fairly well protected from such dangers by the walls of the follicles, which are more resisting than the overlying epithelium, and hence opening and drainage generally occurs in the latter direction before the cellular tissue is involved.

Treatment.—The management of these cases is rather therapeutic than surgical. Diffuse inflammations and perirectal abscesses have followed the reckless opening of superficial abscesses about the margin of the anus or upon the buttocks. A good plan in these cases is to make a very small opening and then apply pure ichthyol or carbolic acid upon a fine applicator to the interior. The free application of pure ichthyol will frequently dissipate these little inflammations or hasten their resolution if simply painted over the surface two or three times a day without any incision being made. Heitzman advised the application of an ointment of 10 per cent salicylic acid and 90 per cent of glycerin ointment, especially in those cases in which these little abscesses had a tendency to recur; the ointment was given to the patient, and he was instructed to apply it the moment he had any pain at a given spot, and in this way suppuration has been prevented in a number of cases, but it is not uniformly successful in this respect. Dr. Swinburne stated that he had been successful in aborting suppuration in many of these cases by the injection of a strong solution of salicylic acid into the inflamed follicle.

Attention to cleanliness is of the utmost importance, and bathing of the parts, especially after defecation, with antiseptic solutions, should be advised.

Excision of these small isolated inflammatory foci has been tried a number of times. In the author's hands it has not proved successful in the neighborhood of the rectum, owing to the fact that it is almost impossible to sterilize the cutaneous tissues of this region. Moreover, as stated before, these abscesses are confined to the derma, and complete excision would only necessitate the invasion of the subcutaneous tissues and thus expose parts to infection which are ordinarily exempt. It is better, on the whole, to depend upon the applications of ichthyol or salicylic acid where these small abscesses open spontaneously; if they do not so open, puncture the apex with a small bistoury, and after emptying the cavity fill it with pure ichthyol. The patient should be kept in a recumbent posture until the acute inflammatory symptoms have disappeared.

Subtegumentary Abscesses.—Circumscribed inflammations of the subcutaneous and submucous tissues are among the commonest results of anal and rectal lesions, and are rarely if ever idiopathic. They are caused by infection of the lymphatics. Although they can not always be traced to any definite solution of continuity in the skin or mucous membrane, it is probable that in the large majority of cases they originate in some such lesion. The infection is carried thence by the lymphatics into the cellular tissues until it is arrested either in the glandular apparatus or by thrombus of the lymphatic trunks, thus limiting it to a focus in which it proceeds to multiply and destroy the tissues, causing a circumscribed inflammation and abscess. Chassaignac, Kelsey, Hartmann, and others claim that these abscesses may develop in isolated external or internal hæmorrhoids due to a phlebitis of the hæmorrhoidal vessels. They do not account for the phlebitis in any way, nor do they state whether the abscess causes thromboses of the veins or whether the thromboses precede the abscess. Frequently such abscesses follow what are termed thrombotic hæmorrhoids, but they always succeed the formation of a clot, and do not occur until several days later. It is difficult to conceive of such a circumscribed phlebitis as would cause clotting of the blood and abscess in one little hæmorrhoid without any inflammation of the other venous trunks with which it is connected, or any constitutional symptoms such as are found in the ordinary phlebitic process. It seems justifiable therefore, in the light of modern pathological investigation, to assert that *subcutaneous perirectal and perianal inflammations are always due to infection of immediate or remote injuries to the skin or mucous membrane, and that the propagation of this infection is along the tracts of the lymphatic apparatus.* The sources of such injuries have already been mentioned and need not be repeated here. These abscesses may be subcutaneous, submucous, or submuco-cutaneous. They are more frequent in middle age, rarely occurring in the very old or very young, with the exception of one variety, the tuberculous, which does occur very frequently in children from two to six years of age.

Symptoms.—The symptoms of this variety of abscess are variable. Sometimes they develop obscurely without chill or fever, with very slight if any pain, opening spontaneously and discharging small quantities of white, thin pus. Such a course is generally indicative of a tubercular process. Ordinarily the physician is only consulted in these cases after rupture and discharge of pus. He then finds a soft, boggy mass with a small ulcerative opening either through the skin or mucocutaneous tissue, from which there oozes a thin, watery pus upon pressure. There is very little evidence of inflammatory reaction such as induration, redness, and pain about the parts. The skin or muco-

cutaneous tissue is undermined in all directions around the opening, and if not properly taken care of this burrowing or undermining is likely to proceed to an indefinite extent. Sometimes it burrows upward beneath the muco-cutaneous tissues and forms a fistulous tract between the coats of the rectum. This burrowing may take place before the abscess opens. The opening then may occur in the rectal cavity, thus forming a blind internal fistula.

At other times these abscesses are ushered in by marked constitutional symptoms. The patient is attacked with a distinct chill, the pulse is accelerated, the temperature elevated, and there is a feeling of general malaise. Locally there is at first a feeling of discomfort which gradually increases to actual pain. Local examination discloses a hard, swollen area at some portion of the anal circumference, hot, red, or violaceous, painful to the touch, and throbbing constantly; cases with such acute constitutional septic symptoms, in which there was a bacteriological examination of the contents of abscesses, have usually shown the presence of streptococci and colon bacteria. These acute inflammatory symptoms have never been met with in cases of pure tubercular abscesses. The severity of the pain seems to be proportionate to the height of the abscess. This can be understood for two reasons: the farther we ascend into the anal canal the more closely are the skin and muco-cutaneous tissues attached to the muscular and fibrous aponeuroses; there is less cellular tissue in which the abscess can distend, and the spasm of the sphincter produced by the inflammatory processes also contributes to increase the pain. Sometimes the abscesses develop entirely within the anal canal, in which case one sees no outward manifestation of the same until the buttocks are forcibly distended or the finger is introduced into the anus, when a protruding, globular mass, either indurated or fluctuating, painful to the touch and obstructing the anal canal, will be found. If left alone they open spontaneously either through the skin or the muco-cutaneous tissues; they rarely open into the rectum proper; they may open near the upper limits of the anal canal and thus form what is termed an internal, blind muco-cutaneous fistula, or they may open upon the skin to form an external blind fistula. The moment they open, at whatever height or in whatever manner, they constitute what is commonly called a fistula of one variety or another, and what is still more typical they do not drain and heal as simple abscesses elsewhere, but remain fistulous unless laid open throughout their whole extent. No explanation of this fact has been given, but every clinical observer is so familiar with it that he never hesitates in these subtegumentary abscesses of the anal canal to carry his incision to the full height of the cavity when he opens them, in order to avoid secondary operations.

When these abscesses open within the anus and upon the skin at the same time, as they sometimes do, they form complete subtegumentary fistulæ. In a very small number of cases the infection may be circumscribed in the submucous tissue of the intestinal wall and thus form an intramural abscess of the rectum (Fig. 109). These cases will be accompanied with mild constitutional symptoms, such as headache, a slight elevation of temperature, heaviness and aching in the pelvis, pain on defecation, and sometimes dysuria. The symptoms resemble those of an inflamed, internal hæmorrhoid, and unless one is educated in digital examination he may mistake one condition for the other. In these cases the finger will discover a globular, doughy, or elastic mass in the rectum, some-



FIG. 109.—INTRAMURAL OR SUBMUCOUS ABSCESS OF THE RECTUM.

times fluctuating, sometimes hard, generally in one or other of the anterior quadrants. The mucous membrane may or may not move over the surface of the mass. By pressure downward with the finger of one hand above the mass, and that of the other upon the external margin of the anus, the swelling may be outlined and grasped, but it does not extend near the cutaneous tissues. Its superficial location in these cases can be well determined by the experienced surgeon. It is a matter of the greatest importance that this should be done, for the opening of these intramural abscesses by deep incision through the skin and perineal tissues is likely to result in diffuse, inflammatory periproctitis, and is almost certain to result in fistula. While these subtegumentary abscesses are generally circumscribed and of small extent, they may also assume a phlegmonous type, extend over large areas, and invade the deeper tissues.

The author has seen one case that originated in this variety of abscess in which the whole skin of the perinæum was undermined from the scrotum to the coccyx, and from one tuberosity to the other. The abscess or burrowing eventually extended upward and forward into the inguinal region, resulting in suppuration of the glands of these parts. This patient recovered after prolonged constitutional treatment and

numerous surgical operations. Bacteriological examination of the discharges were carefully made, but at no time was the pathologist able to demonstrate the presence of any other types than those of *Staphylococcus albus* and colon bacteria. Those cases which progress to the involvement of the deeper areas may be properly considered under the subject of ischio-rectal and profound abscesses.

Treatment.—The treatment of subtegumentary abscesses is purely a surgical one. Ice poultices and antiphlogistic remedies have no place in the treatment of this condition. Whenever a subtegumentary induration or swelling has been determined, unless complicated with syphilitic or malignant disease, immediate and free incision should be made whether pus has already formed or not. If the swelling be due to a subtegumentary hæmorrhage, the extravasated blood ought to be liberated at the earliest possible moment. If it be due to an infection, thorough drainage and antiseptic irrigation will limit its progress. If pus has already formed, the prompt evacuation of this material is the only safeguard against extension of the abscess cavity.

In all these superficial abscesses the operation can be performed under hypodermic injections of cocaine or eucaine. One accustomed to the use of these drugs can operate upon the most sensitive patient in such conditions as this without any more pain than the prick of a fine needle. Cocainization having been established, the incision should be made in the line of the radial folds. These abscesses are generally monolocular and circumscribed, and require no curetting or breaking down of necrotic tissues in their midst. Simple incision and drainage, accompanied with antiseptic washings, will effect a rapid and satisfactory cure in the large majority of cases. The incision, however, must extend from the highest to the lowest point of the abscess; diverticuli in acute abscesses will generally heal without lateral incisions. The cavity should be washed out twice a day with an antiseptic solution, and a small gauze drain should be loosely passed into the wound. Stretching of the sphincter is necessary in those cases in which the incision must be carried through the anal canal and in the intramural variety. The latter are almost the only abscesses which one is justified in opening by incision inside of the rectum. They are purely submucous, do not involve the muscular wall of the rectum, and if thoroughly opened and treated by drainage and irrigation they will heal without the formation of fistula or other complication. The important point is to leave no pocket at the lower end of the cavity. This is likely to occur when they open spontaneously. Under such circumstances one will find some pus present in the rectum; he will still be able to discover the soft, compressed swelling, and through a speculum can see the discharge exude from the opening when he presses upon the mass. It is needless

to say that in such conditions the cavity should be laid open to its lowest extent.

Quiet and rest in bed are essential to the most satisfactory results in the treatment of these cases.

Ischio-rectal Abscesses.—These form a typical variety of what is known as perirectal abscesses. It is generally supposed that they compose the large majority of perianal and perirectal abscesses; but, as has been shown by Etchepare (*Des abcès ischio-rectaux*, Th. de Paris, 1894, No. 352), these fossæ are the seat of abscesses in less than 18 per cent of the total number of cases occurring in hospital practice; and, furthermore, as the large majority of superficial perianal abscesses are treated by the family physician and are never seen in the hospitals, it is reasonable to conclude that the percentage of these abscesses is even lower than Etchepare claimed.

They are generally situated around the rectum itself and not at the margin of the anus. They are outside of the muscular and aponeurotic layers of the rectum and anal canal and beneath the skin and superficial fascias (Fig. 110). They may be limited to one side of the rectum, or may occur upon both sides simultaneously, becoming connected posteriorly through the little space between the aponeuroses of the levator ani and the external sphincter muscles.



FIG. 110.—A, ischio-rectal abscess; B, superior pelvi-rectal abscess.

When they occur upon one side of the rectum and open spontaneously or are incised after they have existed several days, they are very likely to develop upon the opposite side within a period of four or five days. When opened they do not exhibit a single large cavity, but numerous foci containing pus, and may be described as multilocular abscesses. This honeycomb-like condition of the abscess cavity is due to the connective-tissue network which divides the cellular mass into spaces, and in operating, unless great care is exercised to open all of these, the pus contained in them will burrow or infect other

regions, and there seems to be no limit to their extent. When both spaces are involved and connect with each other posteriorly, they form a sort of dumb-bell or horseshoe-shaped cavity. This communication is not uniformly present. The infection originating in an



FIG. 111.—BILATERAL ISCHIO-RECTAL ABSCESS OPENING INTO RECTUM POSTERIORLY.

injury of the anus or lower portion of the rectum, through which the lymphatics of the ischio-rectal fossa become involved, may travel upon one side more rapidly than it does upon the other, and an abscess thus develops upon this side some days previously to its development upon the other. The author has opened an ischio-rectal abscess in his office on one day, and

with careful examination failed to find any implication or even tenderness upon the opposite side, and yet within forty-eight hours he has been called to open a similar abscess at this point, and doing so under general anæsthesia has searched carefully but in vain for any communication between the two. As a rule, however, where these abscesses develop upon both sides they communicate with each other posteriorly through the foramen already mentioned, and ordinarily in such cases an opening will be found in the posterior commissure of the anus, thus constituting a true horseshoe fistula (Fig. 111). This little perforation of the mucous membrane at this point indicates that the origin of the abscess and fistula has probably been a fissure at this seat, through which the lymphatics of the ischio-rectal fossa have become infected. Abscesses that originate in the ischio-rectal fossa may communicate with the retro-rectal space or *vice versa* by perforation of the levator ani, and thus there may be two main abscess cavities connecting by a small aperture (Fig. 112). Abscesses of the pelvi-rectal spaces sometimes approach the surface and open into the ischio-rectal fossæ, but whether those of the ischio-rectal fossæ ever extend upward along the side of the rectum sufficiently high to involve the superior pelvi-rectal spaces and infect the organs with which they are in relationship, is difficult to say. All the cases in which abscesses involved both spaces have given histories which led to the belief that the abscess was originally in the superior space and had involved the ischio-rectal fossa by extension downward through the fibers of the

levator ani muscle, either separating or rupturing them. These abscesses may also connect with submucous abscesses by tracts passing between the sphincter muscles (Fig. 113) or directly through them (Fig. 114).

The importance of all this lies in the fact that if these superficial abscesses may involve the superior spaces it lends a gravity which is not ordinarily attached to them.

Etiology.—The cause of these abscesses is always direct or indirect infection. Puncture wounds and injuries from sharp bodies within or outside of the rectum may carry septic germs directly into the cellular tissue and thus produce abscesses. Ulceration of the crypts of



FIG. 112.—ISCHIO-RECTAL AND RETRO-RECTAL ABSCESES COMMUNICATING WITH EACH OTHER.

The rectum is dissected off and drawn forward.

Morgagni or of the rectum proper may result in ischio-rectal abscesses through direct extension of the ulcerative process or by infection through the lymphatics. The frequent cause, however, of ischio-rectal abscesses is infection through some lesion of the anal canal. Small fissures or wounds in this region are very liable to become infected, and as the infection is likely to affect the middle lymphatics, these will involve the ischio-rectal fossæ. These abscesses frequently follow operations for fistula, stricture, and hæmorrhoids. In these cases it is sup-

posed that they are metastatic. The author, however, has observed, in two cases in which ischio-rectal abscesses followed operations for hæmorrhoids, that upon opening the abscess cavity there escaped a considera-

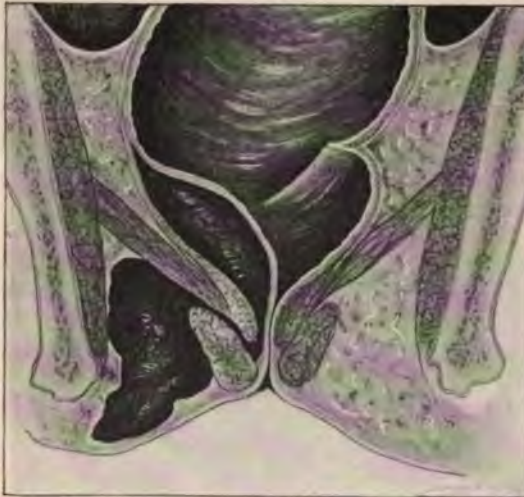


FIG. 113.—ISCHIO-RECTAL AND SUBMUCOUS ABSCESES COMMUNICATING.

ble amount of decomposed or clotted blood along with thin seropus; either the suppurative process caused rupture of the small vessels and hæmorrhage into the fossa, or the vessels were ruptured by the traumatism necessary to dilate the sphincters, and infection occurred later. The latter view seems more rational. It is very possible that one of the lower hæmorrhoidal arteries which ramify in this

space may be torn by this stretching process, and it may go on bleeding until a distinct hæmatoma is formed in the cellular tissue, and this may become infected through the lymphatics leading from the operative field. In the cases observed the symptoms of abscess appeared forty-eight and sixty hours after the operation.

Dilatation of the sphincter in small superficial abscesses at the anal margin may result in ischio-rectal abscesses by squeezing the pyogenic germs out into the perirectal tissues. Contusions and prolonged pressure, such as are caused by long horseback or bicycle rides, may cause these abscesses either by obstruction of the circulation or by producing small anal lesions which become infected.

Symptoms.—As a rule ischio-rectal abscesses develop as an acute inflammatory process; the patient suffers either from a distinct rigor or a feeling of chilliness creeping up and down the back and in the legs; these are followed by fever, accelerated pulse-rate, headache, and at first a discomfort about the rectum. This discomfort changes to a dull aching, which gradually grows into an acute throbbing pain. In the initial stage there will be no swelling apparent to the eye, but induration may be felt around the margin of the anus upon one side or the other. Redness and discoloration may or may not be present, according to the depth of the infection. In the very deep cases, in order to

feel the induration it will be necessary to introduce the finger well into the rectum and press downward and outward while deep palpation is made with the other hand upon the external surface. One will generally be able to make out in such cases a distinct circumscribed mass, globular and more or less fluctuating. When the inflammation has existed for some days, swelling, tension, and redness of the cutaneous tissues about the margin of the anus will appear. Defecation is extremely painful; the patient suffers from difficulty in urination, or may be unable to urinate at all. The constitutional disturbances may become very grave and approach a type of true septicæmia. Sometimes the perianal area assumes an erysipelatous blush, and only a microscopic examination of the blood and discharges can distinguish between these acute, aggravated cases of perirectal cellulitis with circumscribed abscesses and true erysipelas. The inflammatory processes may surround the entire rectum and anus and extend through the perinæum into the scrotum or inguinal regions. These phenomena only occur in extremely septic cases or those in which the treatment has been neglected. If opened early the discharge from these abscesses, which are then small, is of a creamy-white or dark-brownish color. Where the abscess has been due to an extravasation of blood, the clot may be discharged as a whole, or it may appear as disorganized flocculi mixed with pus and serum.

Sometimes the pus is thin and ichorous and contains necrotic shreds or fibrous tissue, indicating the phlegmonous nature of the abscess. Such cases are likely to be followed by

general septicæmia. It possesses a fœtid, gangrenous, disgusting odor; this has been frequently said to indicate connection with the rectum, but it is not the fact. Many abscesses possess this peculiar, fæcal odor and have no connection whatever with the rectum.

The escape of gases from these abscesses when opened has also been thought to prove their connection with the rectum. This is also an

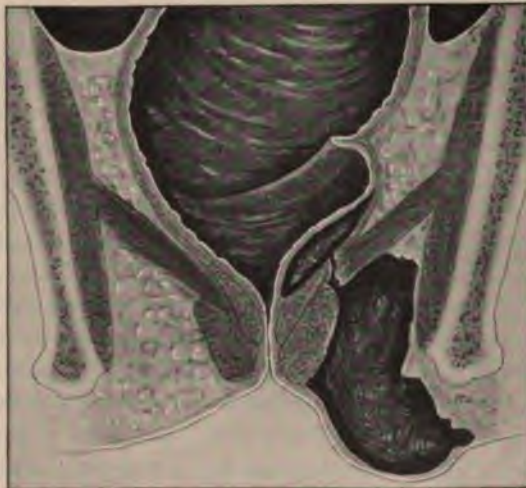


FIG. 114.—ISCHIO-RECTAL AND SUBMUCOUS ABSCESES CONNECTED BY TRACT THROUGH THE MUSCLES.

error. In fact those abscesses which have a connection with the rectum do not contain pent-up gas. When, therefore, an ischio-rectal abscess is opened and gas escapes, it is quite a reliable sign that it has no connection with the gut itself. These gases are due to bacterial decomposition which takes place in the cavity. When an abscess has developed upon one side and opens spontaneously, or has been incised, the temperature will rapidly subside and all the constitutional symptoms, together with the pain, may disappear within twenty-four hours. The pains, however, may recur upon the same side or upon the opposite side, the temperature and constitutional symptoms all reappear, and the patient suffer quite as much as in the first attack. These symptoms are due to the development of another abscess in one of the small compartments of the cellular tissue which was not broken down in the first operation, or to infection upon the opposite side. The appearance, symptoms, and diagnosis of this condition are, of course, more or less identical with those of the first abscess.

All the physical and local symptoms of ischio-rectal abscess may occur from hæmorrhage into the spaces which never become infected. The author has opened what appeared to be a small, deep-seated swelling of this kind and turned out several hard clots with some blood serum, but not a drop of pus. The tension and pain disappeared at once and the parts healed without any suppuration whatever. When such symptoms occur without the premonitory constitutional phenomena, one may anticipate finding this condition or a tubercular process.

Treatment.—All surgeons agree that free incision at the very first moment that induration can be made out is the only treatment which is justifiable in these cases. Cold applications, leeches, hot poultices, etc., have long since been found to be useless in causing resolution. They may delay the formation of the abscess and destruction of tissue for a period and give partial relief to the sufferer, but they never abort the suppurative process. When, therefore, a swelling or circumscribed induration can be made out about the margin of the anus in non-syphilitic cases, the parts should be cocaineized and the induration incised whatever its depth. Puncturing with aspirating needles to determine the presence of pus is not advised. It is not an important question whether pus is already present or not; the object to be attained is to furnish a free outlet through the shortest and most harmless channel to the inflammatory products of the affected area. If this contains only a clot or the products of non-suppurative inflammation, a clean cut made with antiseptic precautions will do no harm. Puncturing with a needle can result in nothing more than to distribute the septic products through its track, and furnish no drainage unless subsequent incision is made. The same objection holds good to punc-

ture with small tenotomes. Careful dissection should be made down upon the indurated mass or abscess cavity by means of an incision wide enough to give the operator a full view of what he is doing, and furnish free subsequent drainage to the discharge. The external incision should be wider than the widest portion of the abscess, if possible, otherwise there will be pockets and diverticuli into which the pus will burrow. The incision should be made parallel to but well outside of the fibers of the external sphincter muscle.

After the abscess is opened the finger should be introduced into the cavity and all the little honeycomb-like fossæ of the cellular tissues should be thoroughly broken down in every direction. Experience teaches one the difference between the feeling of necrotic, suppurating tissue and healthy cellular divisions; it is these necrotic and suppurating fossæ which should be broken down, and this can only be surely done with the finger itself, because curetting with sharp steel spoons is very likely to go beyond the diseased tissues and furnishes no indication of the condition of the parts. These processes ought to be carried on under constant irrigation with a 1-to-2,000 bichloride solution. Should there be considerable oozing or hæmorrhage after the cavity has been emptied thoroughly, it should be tightly packed with gauze for the first twenty-four hours; this packing, however, should be removed at the end of this time and only a light gauze or rubber drain introduced thereafter, because it is of the utmost importance that the walls of the abscess cavity should be allowed to approach each other as nearly as possible in order that rapid union may take place.

Where the abscess involves both ischio-rectal fossæ simultaneously or successively, the question of how to operate may puzzle the inexperienced. Simple incision will empty the abscess unquestionably, but it does not provide for the communicating tract between the two abscesses posteriorly, when such exists. Hartmann states that under such circumstances he does not open the abscesses themselves, but opens the tissues posteriorly between the coccyx and the anus, introducing drains into the abscesses upon each side. The abscess may be opened by moderate incision upon one side and by free incision, extending to the posterior commissure of the anus, upon the other side, thus thoroughly draining this posterior fistulous tract in both directions, and effect good results. In 2 cases in which there was a fistulous communication with the anus associated with bilateral ischio-rectal abscess, comparatively small openings were made in the anterior horns of the abscess and small wicks of silk thread were passed from these openings backward into the wound made at the posterior commissure of the rectum, laying open the fistulous tract from the skin into the anus and enlarging the communication between the two lateral abscesses.

In both of these cases the cures were remarkably rapid and exceedingly satisfactory, being unaccompanied by any of the retraction and infundibular shape of the anus which results when the cavities on both sides and posterior to the anus are laid open.

The author has never seen faecal incontinence ensue from laying open the abscess cavities freely, even though they entirely surrounded the rectum. The objection to this operation is that it results in retraction of the anus, and leaves a deep depression between the folds of the buttocks below the sphincter muscle in which faecal material is liable to be caught, and makes it very difficult to keep thoroughly clean.

When these abscesses open spontaneously into the rectum or anus, as they may do, they constitute internal blind fistula, and should be treated as such. The question, however, arises as to the probability of these abscesses resulting in fistula after they are opened externally. Some writers have held that this is so likely in cases where the abscess approaches very closely the rectal wall it is advisable in all such to convert them into fistulas at once, and operate by incision of the rectal wall to the height of the deepest portion of the abscess. Such practice can not be condemned too forcibly. While a certain number of abscesses will result in perforation of the rectal wall subsequent to their incision, such consequences by no means justify the practice of subjecting a patient to the dangers of incontinence and prolonged cicatrization which necessarily follow the conversion of ischio-rectal abscesses into true fistulous tracts. Where no pathological opening into the rectum or anus exists, it is unjustifiable to make such an opening surgically for the treatment of perirectal abscesses. There is reason to believe that the large majority of perforations into the rectum after the opening of ischio-rectal abscesses are due to imperfect technique in operation. The thorough but gentle dilatation of the sphincter muscles in every case of perirectal abscess is an important feature of the operation; it gives the patient relief from whatever muscular spasm may be occasioned by the perirectal operation and inflammatory process; it removes obstruction to the passages of gas and faecal matter so that no undue pressure may be placed upon the thin rectal wall, which has lost more or less of its external support in the evacuation of the abscess; it prevents a spasmodic contraction of the rectal wall and allows it to more closely approach the external walls of the abscess, thus facilitating rapid granulation and the closing of this cavity. This dilatation should always be made after the abscess has been evacuated: attempts at dilatation before the abscess is opened are very liable to result in rupture of the rectal wall, because this is always more fragile than the overlying skin. Moreover, the pressure and traumatism neces-

sary in such dilatation are likely to squeeze the pus contained in the abscess into the lymphatics, dislodge the thrombi in these vessels, and cause the septic process to extend into other and more remote areas. Therefore, let the abscess be opened freely, its partitions be broken down and washed out with antiseptic solutions, and after this let the sphincter muscle be thoroughly dilated before the wound is dressed. With a drainage-tube in the wound temporarily and a Pennington tube or rectal plug in the rectum in order to facilitate the escape of gas as well as to hold the rectal wall in close apposition with that of the abscess, a fistula may be avoided and a rapid healing be obtained in such cases.

PROFOUND ABSCESS

In the review of the anatomy of these parts attention was called to the retro-rectal and superior pelvi-rectal spaces. Clinically these spaces have been considered as one, and they are called the superior perirectal spaces. Recent anatomical studies have demonstrated the fact that they are divided into three—two antero-lateral and one posterior. The two lateral ones have been denominated by Richet the “superior pelvi-rectal spaces”; the posterior is the “retro-rectal space,” which occupies all the region between the rectum and the anterior surfaces of the sacrum and coccyx. The blood-vessels ramifying in the retro-rectal spaces come from the middle and lateral sacral arteries with a few branches from the inferior mesenteric. Those in the superior pelvi-rectal spaces come from the hypogastric artery and are connected with the general circulation. The lymphatics of the two spaces are also comparatively distinct; those in the retro-rectal space develop about the lower posterior portions of the rectum and coccyx; while those in the anterior spaces originate in the anterior wall around the prostate, the neck of the bladder, the uterine organs, and connect with the iliac plexus and the lateral trunks of the lymphatic system. With such distinct anatomical divisions, vascular supply, and lymphatic distribution, one can clearly understand why a distinction is made between the circumscribed inflammations in these two areas and call them *retro-rectal* and *superior pelvi-rectal abscesses*.

The interstitial abscess represents a class occurring at more or less remote points from the rectum itself in the muscular or cellular tissues of the buttocks and due to infection carried from the perirectal tissues along the course of the lymphatics through the obturator foramen or the ischiatic notch.

Retro-rectal Abscess.—This variety develops in the cellular space between the rectum and sacrum above the attachments of the levator ani (Fig. 115). It may be due to necrosis of the bones of the

pelvis, the sacrum, coccyx, ileum, or bodies of the vertebræ; it may result from perforation of the rectal wall by sharp foreign bodies in the intestinal canal or by instruments, such as bougies or syringe-tips. One of the most frequent causes is the operation of posterior proctotomy or incision of strictures unaccompanied by thorough drainage. Fistulous tracts outside of fibrous strictures of the rectum may also occasion it. Gummata, the caseation and breaking down of tuberculous lymphoid nodules, and infection by propagation along the lym-

phatic channels from ulceration of the rectum above the external sphincter may all cause them.

Quénu and Hartmann state that abscesses of the appendix may extend into this space and thus open into the rectum. The appendix being within the peritoneal cavity and often extending down into the pelvis, it appears that such abscesses are much more likely to invade the superior pelvi-rectal than the retro-rectal spaces. The author has seen one, and had communicated to him three instances in which such abscesses have opened into the rec-

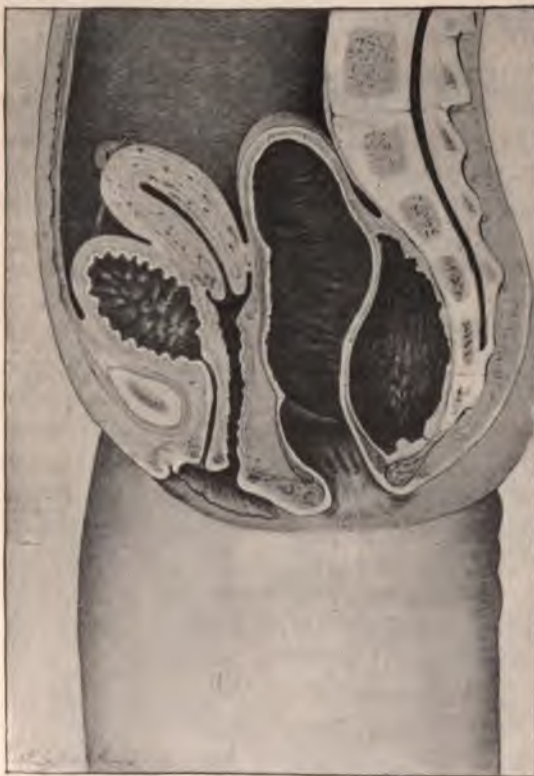


FIG. 115.—RETRO-RECTAL ABSCESS.

tum either spontaneously or by rupture during an examination of this organ. The cases were all in women; they simulated true pelvic abscess, and the perforation was always in the anterior wall of the rectum. The appendicular origin was proved by subsequent operation. While, therefore, it is possible that such abscesses may penetrate the retro-rectal space, from these facts and the anatomical relations this course would appear very unlikely. It is not unusual for retro-rectal to follow ischio-rectal abscesses or varicose ulceration; they are not at all uncommon

after resections of the rectum, and they may also result from gunshot wounds of the pelvis.

Symptoms.—The development of such abscesses is always obscure. They are not usually ushered in by distinct rigors and constitutional manifestations. A dull aching in the sacrum, with pelvic weight and sciatic pains associated with slight elevation of temperature, general malaise, constipation, with or without pain at the time of defecation, and a gradually increasing sallowness of the skin such as accompanies chronic suppuration elsewhere in the body, are the general symptoms.

Palpation around the margin of the anus and in the perinaeum does not, as a rule, elicit any pain or induration. Examination of the rectum with the finger may sometimes demonstrate the presence of nodules more or less circumscribed and inflamed, or a diffuse, boggy mass in the hollow of the sacrum. In the beginning this mass will not be fluctuating, tense, or painful, but as the suppuration increases the tension of the parts becomes more marked, and partial obstruction of the rectal canal with dysuria may develop. Eventually the abscess may burst spontaneously into the rectal cavity, or it may perforate the levator ani, infect the ischio-rectal fossæ, and finally open on the skin.

Where the retro-rectal abscess has existed for some time, it may burrow between the fibers of the levator ani muscle and develop in the wall of the rectum itself a submucous abscess such as has been found in a case reported by M. Quénu (Quénu and Hartmann, p. 146). When these abscesses secondarily invade the lower areas around the anus, constitutional symptoms, associated with pain and great depression, always ensue.

An interesting case of this kind occurred in the Polyclinic Hospital in 1898.

Abstract of history:

J. P., aged fifty-two, janitor, had suffered for several weeks with a dull, aching pain in his back, difficulty in movement of his bowels, and gradually increasing weakness. Only a few days previously, however, he had his first distinct rigor. This was followed by a high fever and acute pains in the buttocks and around the margin of the anus.

When first seen the whole perianal region was distended, tense, hard, fluctuating, and of a dark violaceous color that indicated the rapid approach of gangrene of the parts. Apparently it was a case of diffuse, septic periproctitis. Incision, however, into the ischio-rectal fossa gave issue to an immense quantity of most fetid pus. So sickening was the odor from this discharge that several of the students were nauseated and compelled to leave the room. After evacuation of the ischio-rectal cavity it was found that pressure through the rectum toward the hollow of the sacrum occasioned a continuous flow of pus from the wound. Searching the cavity with the finger, a small opening was found between the ischio-rectal fossa and the retro-rectal space. This opening was enlarged, and a long uterine probe was introduced to its full length upward over the promontory of the sacrum

without reaching the upper limits of the abscess cavity. At the time, the author was convinced that this abscess was due to a necrosis of one of the bodies of the spinal vertebrae, and gave an unfavorable prognosis with regard to the patient's recovery. The only symptoms contraindicating such a prognosis were the acute septic phenomena which had occurred in the later stages of the disease. Such symptoms rarely accompany tubercular abscesses and those due to necrosis of bone.

This patient made an uneventful recovery after about ten weeks' residence in the hospital. The time between the first chill and the date of operation was entirely too brief for such extensive burrowing upward to have taken place, and therefore it was undoubtedly a case of retro-rectal abscess which had burst through into the ischio-rectal fossa and caused an acute suppurative process there.

Such abscesses may also burrow outward through the ischiatic notch, forming diverticuli or pockets in the tissues of the buttocks. This course, however, is very rare. Those occurring in this region are usually metastatic or interstitial abscesses due to propagation by the lymphatics, as stated above.

Treatment.—The treatment consists in thorough drainage. A semi-circular incision between the anus and coccyx is the best in these cases. After thorough evacuation, the cavity should be washed out with peroxide of hydrogen followed by 1-to-2,000 bichloride solutions. Gentle curetting of its walls may be advisable sometimes, but one should be careful in doing this laterally and anteriorly that he does not penetrate the superior pelvi-rectal spaces or the rectal cavity itself. Unless one is experienced in these operations he had better desist from such a procedure and allow nature to take care of the sloughing tissues.

After washing out the cavity one should introduce two long rubber drainage-tubes and maintain them in position by suturing them to the edges of the skin or pinning them there with a safety-pin. Through one of these tubes an irrigating fluid may be carried in while it is discharged from the other, and thus the abscess cavity may be kept entirely clean. The sphincter should always be stretched after the abscess is evacuated, and the stools kept regular but not loose. No packing further than that necessary to check the first oozing of blood should be used in these cases. It prevents drainage and delays healing. Tonics, good, nourishing diet, and such specific medication as seems indicated should be employed. It is also a good plan to keep these patients on their feet most of the day, as this facilitates the drainage both through gravitation and through pressure upon the parts by the pelvic and abdominal contents. Sitting should not be allowed until the abscess has practically healed, as this posture interferes with the circulation and drainage of the parts.

Superior Pelvi-rectal Abscess.—These are not, as a rule, developed from rectal inflammations, but generally arise from affections of the bladder, urethra, prostate, uterus, or broad ligament. In women they

are ordinarily termed pelvic abscesses, and arise from infectious diseases of the generative organs. In men they often occur as the result of posterior urethritis or inflammation of the prostate, and simulate abscess of this organ.

Psoas abscesses, necrosis of the bones of the pelvis, suppuration of the broad ligament, perinephritis, vesiculitis, and appendicitis may all cause a collection of pus in the superior pelvi-rectal spaces. Abscesses may also occur here as the result of inflammations or injuries in the anterior rectal wall, the infection being carried by the middle lymphatics and arrested here owing to the sudden bend of the vessels in the lower part of these spaces. Traumatism from childbirth or instrumentation of the uterus or prostatic urethra, operations for stone, prostatectomy, and uterine tumors have all been known to produce these abscesses, but the chief causes are inflammations of the prostate, seminal vesicles, uterus, and broad ligaments.

Symptoms.—The premonitory symptoms of such abscesses are those of prostatitis, vesiculitis, and posterior urethritis in men, and the inflammatory phenomena of pelvic or uterine disease in women. They are often mistaken for ovarian and tubal abscesses or tumors of the broad ligament.

They are usually ushered in by chill, fever, accelerated pulse-rate, deep, aching pain, and interference with the urinary functions. Occasionally they develop in a slow, insidious manner without chill and with very slight fever. Dysuria, hæmorrhage from the bladder, and even complete obstruction of the urine due to pressure upon the ureters has been known to take place. Edema of the scrotum and vulva with pains in the perinæum and testicles are also sometimes present. Difficulty and pain in defecation are not marked symptoms in the early stages.

Where the inflammation is of a tubercular type all of these symptoms will be less marked and more slowly progressive. Where it is due to gonorrhœa, as it often is in both sexes, the temperature may rise very high and the constitutional symptoms become alarming. The abscesses have a tendency to burrow upward into the iliac fossa and outward toward the abdominal wall rather than downward toward the perinæum (Fig. 110, *B*), owing to the greater resistance in this latter direction. They may perforate the peritoneal cavity, causing acute septic peritonitis and death within a short time. Inflammation may also spread to this membrane without perforation, and develop either a localized or general peritonitis. Perforation of other organs, such as the bladder and rectum, may result at any time during their course. The discharge of large quantities of pus from the rectum or through the urethra accompanied by more or less relief from the feeling of tension, weight, and pain within the pelvis, would indicate this.

Perforation through the vagina in women is rare, but may occur. The diagnosis of superior pelvi-rectal abscess rests largely upon a history of diseases and symptoms connected with the genito-urinary and reproductive apparatus; the patient rarely gives any account of previous rectal disease; perianal and perineal palpation only elicits a deep tenderness but no swelling or induration. Digital examination of the rectum will generally elicit a tenderness above the prostate in male patients and to one side of the central line. In females the abscess is usually high up, and requires a long reach of the finger in order to determine its existence. Pain upon pressure, induration, and thickening of the rectal wall may be felt, together with a circumscribed swelling, which in thin people may be outlined by the finger in the rectum and palpation of the abdomen from above. When the abscess has existed for some time and become quite tense, it may extend downward between the rectum and the prostate, enter into the ischio-rectal fossæ by perforating the levator ani muscle, or even penetrate the retro-rectal space.

The diagnosis is not difficult in these late stages; it is only in the early periods of inflammation that one finds it hard to determine the exact nature of the condition. It is useless to insist upon the importance of this being made early in view of the grave complications which may result from delay. The fact that the patient has only slight elevation of temperature or a comparatively slow pulse-rate does not contraindicate the presence of deep pelvic abscess. Sometimes they develop a low grade of fever with typhoid symptoms, diarrhœa, and mental depression. These cases have been mistaken for typhoid fever more than once. The urinary symptoms often mask the rectal symptoms in men, and patients go from one hospital to another, having sounds passed, the urine drawn, and the bladder washed out for acute cystitis and enlarged prostate, whereas the condition is due to pelvic abscess, which is not diagnosed, if indeed a rectal examination is made at all. In women these symptoms, instead of being referred to the urinary apparatus, are generally taken to indicate an inflammatory condition of the uterine organs, and vaginal examination is soon made. Gynæcologists are in the habit of making rectal examinations in order to corroborate the information obtained *per vaginam*, and the result is that such abscesses rarely escape notice in this sex. In men they are situated, as a rule, anterior to and at one side of the rectum; they may be upon a level with or just above the prostate. In women they are liable to be more upon one side than anteriorly, because the pelvi-rectal spaces are practically separated in front by the close union between the rectum and vaginal wall below, and because the lymphatics which carry the infection run along the borders of the broad ligament and

are therefore distributed upon the sides more than anteriorly. The general course which such abscesses pursue and the extent to which they burrow have been already mentioned. They sometimes entirely surround the rectum and destroy all the cellular tissues between the levator ani and the peritonæum. They may break a way through the levator ani muscle, enter the ischio-rectal and retro-rectal spaces, and finally make for themselves outlets at some portion of the circumference of the anus. When, however, one comes to open such a cavity or to examine the discharges he will find it almost impossible to determine the origin and pathological cause, owing to the fact that the abscess has remained chronic for so long that the production of phagocytes and their destruction of the pathological bacilli often render microscopic examination and cultures negative. In such cases, where great destruction of tissue has taken place around the rectum, the probability of absolute restoration of the functional action to the parts is somewhat remote. Fibrous and cicatricial deposit are likely to result in stiffness and contraction of the gut wall, which it is very difficult to overcome.

In the early development of these abscesses it may be almost impossible to diagnose them, although the general symptoms indicate pus formation. Where the surgeon is unable to make out the collection by combined digital touch and abdominal palpation, an examination of the blood may show a marked increase of white blood-corpuscles, and may give a fairly positive indication of the condition with which he has to deal. Examination of the rectum by long rectal tubes, and even soft-rubber bougies, is contraindicated in cases in which pelvic abscesses are suspected on account of the danger of rupturing the wall of the rectum and thus opening the abscess into it.

Treatment.—The treatment of this condition consists in evacuating the pus at the earliest possible moment and affording the cavity a free drainage.

The methods of evacuating these abscesses are not so easily described. Ziegler and many of the earlier surgeons advocated opening them through the rectal wall. Where no pathological opening in the rectum exists, it is rarely justifiable for a surgeon to make one. A deep dissection through the perinæum to find and evacuate the abscess cavity is the proper course. The rectum may be dissected away from its attachments to the prostate and bladder for a distance of $2\frac{1}{2}$ inches in order to reach an abscess in the superior pelvi-rectal space and give free drainage. If possible the surface wound should always be equal to the widest portion of the abscess cavity. It is only by making such incisions that diverticuli or pockets can be avoided. Deep punctures with small, sharp bistouries are likely to wound blood-vessels which

can not be seen, they may penetrate the peritonæum, they leave long, narrow tracts in which the discharged pus causes infection and secondary abscesses, and drainage is never satisfactory through them. Wide, free, open dissection to whatever depth the abscess may be, is therefore the rule in this class of cases. Where the abscess is well defined upon one side, the incision may be made upon that side in a line parallel to the fibers of the external sphincter, but well removed from the anus. Where it apparently surrounds the anterior rectum, the incision should be carried upward in the recto-urethral plane, being careful not to wound the urethra or to invade the peritoneal *cul-de-sac*. If the incision should extend as high as $2\frac{1}{2}$ to 3 inches, the surgeon should carry it upward by dull dissection and make efforts to push the peritonæum above by the finger rather than by the use of a knife.

When the abscess has been reached and the pus begins to be discharged, a long tube should be introduced into the cavity and thorough irrigation with peroxide of hydrogen, bichloride, or carbolic-acid solutions should be carried on until it is thoroughly evacuated. After this the finger should be introduced into the cavity, and as far as possible the extent and direction should be examined. Tearing or stretching of the opening into the cavity is not advisable, because the tissues are tender and one never knows in what direction they will give way; it may be into the peritoneal cavity, it may be into the bladder, or it may be into the rectum. Therefore we should incise the wall in the direction of greatest safety, guiding the knife or scissors with the finger, and thus widen the opening into the abscess cavity without danger of invading the other pelvic organs. After the abscess has thus been evacuated and free drainage furnished, the sphincter muscle should always be thoroughly stretched, in order to avoid any obstruction to the passage of gas and fæcal matters which might add an additional strain to the weakened sæptum, between the rectum and the abscess cavity.

The curetting of such abscess cavities is rarely, if ever, advisable. The author's experience does not agree with that of Dr. Kelsey, who says in his latest work, "That to reach pus by a perineal incision would seldom be practicable in these cases." *Any perirectal abscess which can be felt by the finger in the rectum can be reached by perineal dissection, and should be so reached and opened.* If by any possibility the urethra or bladder has been opened by the ulcerative process, the conversion of the abscess into a perineal urinary fistula will be by all means the safest and surest road to cure.

In males there is only one other procedure, and that is the opening of the abscess through the rectum, which is not only unsatisfactory from the point of view of drainage, but it is liable to leave pockets

and burrowing diverticuli, and if there is perforation of the urinary organs, will result in recto-vesical or recto-urethral fistula. Aside from this, it only opens a new channel for infection of the walls of the abscess by the bacteria of the intestinal canal. It need not therefore be further considered.

The practice of introducing long aspirating needles through the perinaeum or through the rectum into swellings or tumors between the rectum and the bladder or prostate is objectionable for the reasons that, introduced through the rectum, the pus is sure to follow the needle outward, thus necessitating an opening into that cavity; if the tumor proves to be a neoplasm, the needle carried through the mucous membrane is very liable to infect the same and produce an abscess or septic condition. If introduced through the perinaeum the dangers of wounding the peritoneal pouch, and the fact that pus will surely follow outward in the track of the needle if an abscess is present, and infect a tract which it may be impossible to absolutely follow in dissecting down upon the abscess, thus leaving a new line of infection which is not properly drained, are sufficient to condemn it. Experience and judgment in the examination of these cases should render the operator certain enough of his diagnosis as to a collection of fluid in any case in which he can reach the swelling with his finger, and whether that collection be a cyst, an extravasation of urine or blood, or a collection of pus, perineal incision and drainage should be made without the blind test of aspiration.

As to drainage in these cases, a rubber tube is preferable to gauze. In many instances gauze wicks have been introduced into the abdomen after operations for appendicitis, and into abscess cavities about the rectum and in other portions of the body for drainage, and yet when those wicks have been drawn out there have been accumulations of greater or less quantities of pus at the bottom of the cavities, which the gauze wicks seemed to obstruct rather than to drain. The gauze drain is not satisfactory where there is a thick, tenacious pus. Packing of the abscess cavity is always inadvisable. The walls should be allowed to come as closely in contact as possible. Therefore small drainage-tubes just sufficient to keep the cavities free from collections of pus are best. Frequent irrigation with antiseptic solutions is also important. Sometimes a strong solution of bichloride of mercury (1 to 500) is run into the cavity, and this is washed out with a milder solution (1 to 5,000) immediately thereafter. If the wound exhibits a sluggish tendency and the abscess does not heal as rapidly as the general condition would indicate, it will sometimes be advantageous to inject the cavity or swab it out with 95-per-cent carbolic acid or pure ichthyol. In order to apply the latter the drainage-tubes may be taken out, and a

narrow strip of gauze saturated with the drug introduced into the cavity and left for two or three hours. It should then be removed and the drainage-tubes reintroduced.

In such operations the sphincter muscles are to be avoided, but incision of the levator ani is not only unavoidable but desirable. A simple separation of the fibers may evacuate the pus which is situated just above them, but as soon as the distention produced by the abscess has disappeared these fibers will come together again, and thus the abscess cavity will be very imperfectly drained. The muscle fibers, therefore, should be cut at right angles in order to prevent this re-contraction and interference with the drainage.

In women these conditions are likely to be very chronic and to have existed for long periods of time before being opened. The chronic pelvic cellulitis spoken of by different writers is often associated with collections of pus which neither increase nor decrease to any great extent, but which remain *in statu quo* for month after month, the connective-tissue deposit thickening and increasing about it all the while. It is through this process that stricture of the rectum, even to the extent of absolute obstruction, may be produced.

Constipation is always an unfavorable symptom in these cases, and the longer the abscess exists the more marked will it appear. When pus forms, whether in the tube or in the broad ligament, especially if the superior pelvi-rectal spaces are involved, it should be evacuated through the vagina, if possible, at the earliest possible moment under the strictest antiseptic precautions, and free drainage be obtained.

Where the abscess points upward above the pubis or in the iliac fossa, openings may be made in these regions and drainage secured. At the same time healing will be facilitated if the abscess is given a dependent drainage by dissections upward through the perinæum or vagina into its lowest prolongation. This prolongation can be determined by the use of a full-sized probe introduced through the abdominal opening and felt with the finger of the other hand introduced into the rectum or vagina.

Diffuse Septic Periproctitis.—Before the days of antiseptic surgery, surgeons were accustomed to meet a diffuse form of inflammation involving all the perirectal tissues. The condition generally followed an injury to, or an operation upon, the rectal wall. It has been described under the titles of perirectal cellulitis, septic periproctitis, and by Bouilly (*Archiv. gén. de méd.*, Paris, 1879, pp. 35, 162) as diffuse pelvic cellulitis. The condition is characterized by an acute inflammation of the perirectal tissues, especially those of the retro-rectal and ischio-rectal spaces. It is essentially a septic process of very virulent nature. It comes on at any time from a few hours to three

days after an injury to, or operation upon, the rectum. Strangely enough a case of this disease rarely occurs unless perforation of the rectal wall itself has preceded it, and yet in its destructive processes the walls of the rectum and anus are rarely involved. The inflammation is generally confined to the perirectal tissues. The infiltration assumes at first a sort of semisolid condition, changing later to a sero-purulent discharge when the tissues are laid open. The inflammatory process may extend upward and forward, involve all the pelvi-rectal spaces, and may invade the peritonæum through extension, osmosis of the septic agents, or by absolute perforation. In the first instance the peritonitis will be of an intense septic type, or ultraseptic as described by Quénu, unaccompanied by any great adhesions between the abdominal organs.

Symptoms.—The patient does not usually suffer from a distinct rigor, but at a period somewhere between a few hours and three days after the operation upon or injury to the rectum, a creeping chilliness comes on succeeded by accelerated pulse, high temperature, headache, brown-furred tongue, and sometimes severe vomiting. The pain in the wound increases greatly, with a sense of fulness and weight in the sacral region; the discharges change to a grayish, bloody, fœtid character, and the perirectal tissues assume a bright-red, tense, and shining appearance. The mucous membrane of the rectum and anus remains unchanged or becomes cedematous and swollen. Great weakness and depression follow rapidly upon this condition, and the patient is sometimes seized with an exhausting, liquid diarrhœa. The constitutional symptoms are those of general sepsis, very closely resembling that type known as puerperal fever. All the perineal and inguino-crural tissues may be involved in the process. Difficulty of urination, even suppression of the urine, may complicate affairs. Complete loss of appetite and inability to retain food are ordinarily present. During the course of the disease septic endocarditis or pericarditis may develop, thus hastening the end. Unless checked by treatment the disease runs its course and ends in death from the second to the tenth day.

Treatment.—The treatment is one of prevention rather than cure. It is a disease which should not occur at the present day. Of course there may be cases in which accidental injuries, such as puncturing wounds, may invade the perirectal tissues and thus give access to the virus, but such cases are so rare that one need hardly consider them. The whole secret of prevention lies in antiseptic precautions and free, wide drainage in all operations about the rectum. The operations which are more likely than any other to be followed by such a complication are those of proctotomy for stricture or resection of the rectum for tumors. If, however, the disease should occur notwithstanding

proper surgical precautions, the treatment consists in bold incisions into all the swollen and inflamed tissues, followed by frequent antiseptic irrigation with the application of heat in the interim in order to promote the circulation and prevent the occurrence of gangrene in the parts. Where the symptoms of general sepsis are very marked, the injection of antistreptococcus serum may be of advantage.

It has been suggested also in such cases that saline infusions into the veins will result in the destruction of the bacilli in the blood and in sustaining the strength of the patient until the septic depression has passed away. In instances in which this has been done in very late stages, death followed in due time; experience, therefore, does not justify the statement that this procedure will be of any practical benefit. No drugs have any particular effect upon these septic conditions. In the light of modern therapeutic researches, administering carbolic acid in large doses might possibly be of some benefit. It has been demonstrated that this drug can be administered in doses of from 3 minims in children to 12 minims in adults, every three hours, without the production of toxic symptoms except in cases with personal idiosyncrasies. It does seem to have some bactericidal influence in such microbic diseases as whooping-cough, pneumonia, and typhoid fever. It might therefore be advisable to administer it in septic periproctitis. Salol accompanied with strychnine or quinine will be of use to control the bodily temperature, while it is at the same time an intestinal antiseptic. The main reliance, however, will be upon the frequent antiseptic irrigations and repeated early incisions into all the tissues involved.

Idiopathic Gangrenous Periproctitis.—Under the title of idiopathic gangrenous cellulitis, Furneaux Jordan (*Brit. Med. J.*, Jan. 18, 1879, p. 73) has described an unusual type of perirectal inflammation. It consists in a slowly extending cellulitis unattended by much swelling and pain. It develops usually without any previous injury, but may follow surgical operations about the rectum. In its general aspect it resembles very much the condition seen in urinary infiltration of the perinæum. It occurs, as a rule, in large, stout, well-preserved individuals and in active and excitable men given to heavy eating and drinking: as Jordan says: "In men sufficiently well-to-do to indulge at will, and who firmly believe that excessive work needs excess of victuals and liquor; in men who are indifferent to weather and have been notably exposed to cold and wet."

The disease begins on the level of the anus, or sometimes in the deeper tissues. It progresses very rapidly, and there seems to be no limit to its extent. Gibbon (*London Lancet*, 1890, vol. i, p. 747) described a case in which the process extended to the scrotum and entirely

destroyed it. Wyman (American Lancet, Detroit, March, 1892, p. 244) has reported a case in which the whole perinæum and skin over the buttocks were rapidly destroyed by the gangrenous process. Cases have also been reported by Gerster and Kelsey in this country, but the most extensive and remarkable one is that related by Quénu and Hartmann (*op. cit.*, 137). This was the case of a large, strong man, a heavy eater and drinker, who was seized with pains about the region of the anus without any known cause; a rigid tumefaction and redness of the area about the anus and perinæum followed, extending between the scrotum and the thigh upward into the iliac region over the abdominal surface, even to the axillary region. Great phlegmonous infiltration with blisters, gangrenous plaques, and the development of gas in the two ischio-rectal fossæ existed. Posteriorly the infiltration passed across the sacrum. The urinary apparatus in this case remained normal. The tongue was red and dry, and the temperature reached 40° C. After about three months' treatment, with frequent incisions and drainage of the involved areas, this patient recovered.

Etiology.—Thus far no satisfactory etiology has been suggested for this disease. In Gerster's case there existed a diabetic glycosuria, and he suggested the possibility that it caused the condition. In the other cases reported no such complication has been observed. Dungalson, adopting the term of Fuchs, described it under the title of proctocæce. According to Fuchs it is a common condition in Peru (Quito and Lima), in Brazil, and on the Honduras and Mosquito coasts. It is called by the Portuguese "bicho" and "bicho di culo." In Quito it is termed "mal del valle" on account of its prevalence in the valleys. It is also known in Africa, where it is called "bitios de kis." From its frequency in these regions one would judge that climate, soil, and modes of life had something to do with its production. It has been attributed to the use of decomposed foods and excessive indulgence in condiments and spices. On the contrary, all the cases seen by Jordan occurred in cold weather and in the high table-land of mid-England, and no case has been reported in the female sex. It seems, therefore, that climate can not account for it.

Symptoms.—The disease comes on with a chill followed by high fever and great mental and constitutional depression. There is some pain in the neighborhood of the anus; the skin is red and brawny, the epithelium elevated and covered with small phlyctænæ, which soon break down and leave black gangrenous masses which discharge an ichorous fluid instead of pus. The chief characteristics of the disease are its rapid extension and its tendency to light up again and invade other tissues after it has once been apparently checked. Invasion of the ischio-rectal and superior pelvi-rectal spaces and thus upward into the

peritonæum is its common course. It may enter the retro-rectal space, passing out through the obturator foramen and invade the subtegumentary tissues, as in one case described by Jordan. Wherever the peritonæum becomes involved death rapidly ensues. The temperature runs very high, the tongue is dry and red, and the whole condition is characterized by great adynamia. Even after free incisions have been made in the inflammatory mass the discharge does not assume the nature of pus, but rather a sanious ichor of a most putrid nature. The gangrenous process is self-limited. If the patient does not succumb to sepsis and exhaustion during the early periods of the disease, it will require the utmost skill and perseverance to maintain his strength through the chronic process of getting rid of the large necrotic masses which may be accompanied with frequent hæmorrhages, any one of which may bring on the end.

Treatment.—The treatment of this condition consists in early and repeated incisions through all the gangrenous tissues in whatever neighborhood they may be, followed by antiseptic irrigation and hot antiseptic poultices. While these incisions do not give vent to any circumscribed collections of pus or ichor, they open the cellular channels for the oozing out of the œdematous collection in the necrotic masses, and thus relieve the tension and prevent to a certain degree the absorption of the products of decay.

Owing to the fact that the blood-vessels themselves frequently remain intact, such incisions may be accompanied with dangerous hæmorrhages. Jordan mentions an instance of this kind in which the ingenuity of the attending physician was greatly exercised in order to control the bleeding. He finally succeeded in doing so by the introduction of a Barnes's dilator into the rectum, and distending this organ so as to produce sufficient pressure upon the parts to control the hæmorrhage.

Ligatures are not likely to prove successful, as the blood-vessels are so brittle and altered that they would likely cut through. Firm pressure is the most reliable means of controlling the flow.

General stimulation together with hypodermoclysis is necessary, and all those therapeutic and dietary resources for the maintenance of strength in adynamic diseases should be taken advantage of. In the large majority of instances the disease results fatally sooner or later from septicæmia or general exhaustion.

CHAPTER XI

FISTULA

THE Latin word *fistula* signifies a pipe or reed, and has been applied to this disease on account of the occasional reed-like shape of the tracts and the passage of air through them. It is a misnomer, however, as the large majority of fistulas are tortuous, very irregular in shape, and gases do not pass through them.

Definition.—Ano-rectal fistula may be defined as *any unnatural channel extending from the skin or muco-cutaneous tegument about the anus, or from the mucous membrane of the rectum into or through the surrounding tissues.*

The essential characteristic of the disease is chronicity. A freshly opened abscess, either external or internal to the rectum, forms a sinus, but one which may heal completely in a short time; unless it has both an external and internal opening it would not be termed a fistula until it had shown no tendency to heal for a considerable period. It would save confusion if the term were confined to that type ordinarily known as the complete variety. Under the accepted nomenclature, however, every chronic abscess cavity is a fistula. Accordingly, they are broadly classified as *incomplete* and *complete*.



FIG. 116.—BLIND EXTERNAL FISTULAS.

Classification.—*Incomplete Fistula.*—This variety embraces all those cases which open on one surface only. When the opening is outside of the ano-rectal line it is called *blind external fistula* (Fig. 116), and when it is within the rectum, *blind internal fistula* (Fig. 117).

Complete Fistula.—This type includes all those cases in which there is both an external and internal opening, and a pervious tract from the

surface outside of the anus into the cavity of the anus or rectum (Fig. 118).

Fistulas are also classified according to the tissues involved. Those which simply pass underneath the skin, muco-cutaneous or mucous tissues, are termed *subtegumentary*, *submuco-cutaneous*, or *submucous* (Figs. 117, A, 119). Those which pass outside of the muscular apparatus of the rectum or



FIG. 117.—BLIND INTERNAL FISTULAS.
A, subtegumentary; B, subaponeurotic.

anus are called *submuscular* or *subaponeurotic* (Figs. 116, 118).

In addition to these divisions there are also *simple*, *complex*, and *complicated* fistulas. The simple fistula consists in a sinus tract leading from the skin or mucous membrane into the perirectal tissue, or a complete tract leading directly from an opening in the skin to one in the mucous membrane. The complex variety consists in variations of these conditions, such as wide burrowing and great tortuosity of the tract, the existence of two or more openings on the skin with one in the rectum, or two or more in the rectum with one upon the skin. By the term *complicated fistula* is meant those cases which are complicated by necrosis of the bones, or by connections with other organs, such as the bladder, urethra, vagina, and uterus. The latter require special consideration and peculiar treatment. It is therefore considered wise to study them apart from the ordinary ano-rectal fistulas.



FIG. 118.—COMPLETE SUBAPONEUROTIC FISTULAS.
Showing irregular tracts.

Finally, fistulas may be classified according to their pathological

causes into *specific* and *non-specific* types. The specific types are those due to tuberculosis, carcinoma, and syphilis; the non-specific are those due to simple inflammatory processes or injuries. On account of the tuberculous variety, this classification is of great importance.

FREQUENCY OF FISTULA.—The frequency with which fistula occurs in comparison with other rectal diseases may be gathered from the statistics of special hospital services. In St. Mark's Hospital, London, as quoted by Allingham, out of 4,000 rectal cases, 1,057 persons suffered from fistula and 196 from abscesses, of which 151 subsequently became fistulas. One may therefore practically state that 1,208 out of 4,000 cases, or nearly one-third of all rectal diseases, were fistulas. These statistics are taken from the walking cases, whereas the records of the hospital show that two-thirds of those operated upon in this Mecca for these sufferers were cases of this disease.

In examining the reports of the general hospitals in this city it is found that over one-half of the cases operated upon for rectal diseases in five years were fistulas. In the author's service at the Polyclinic Hospital the percentage is not so high; this may be attributed to the fact, however, that all the inflammatory and catarrhal conditions of the lower intestine are treated in this clinic, whereas a number of fistulas fall into the hands of general surgeons, and therefore the proportion is reduced. Even under these circumstances this condition comprises one-fifth of all rectal diseases.

With regard to the proportionate frequency of the different varieties it may be said that complete fistula comprises about 70 per cent, blind external fistula about 20 per cent, and blind internal about 10 per cent of the cases recorded.

As to the frequency of simple and complex fistulas the experience of surgeons differs greatly. If we consider only those cases complex which have more than one opening either externally or internally, then the complex variety will only comprise about 5 per cent of the cases seen. On the other hand, if we consider those cases complex which consist in tortuous tracts burrowing in different directions, or partially surrounding the anus, the proportion between the two will be materi-



FIG. 119.—SUBTEGUMENTARY FISTULAS.
A, blind external; B, complete.

ally altered; in fact, the majority of chronic fistulas are complicated by some such diverticuli or burrowing tracts. It would complicate matters to consider all such cases complex; therefore it is better to confine the term to those cases which have multiple openings upon one surface or the other.

Etiology.—With few exceptions all fistulas originate in abscesses. They may occasionally be produced by penetrating wounds which extend from the external surface into the rectal cavity. Two cases of this kind have come to the notice of the writer: in one the patient was thrown from a wagon and fell upon the metallic stem of an umbrella, which punctured the skin about 1 inch from the anus, and passed through into the rectum $1\frac{1}{2}$ inch above the anal margin; in the other the condition was caused by squatting down upon the sharp stump of a weed. This case has been referred to in the chapter on accidents and injuries. In each case complete fistula resulted.

Gunshot and bayonet wounds may produce them (Med. and Surg. History of the War of the Rebellion). Ordinarily intermediary abscesses occur in such cases, but always there is infection which gives to the wound the chronic characteristics which constitute fistula. In general one may say that abscess or destructive ulceration always precedes fistula. Whatever produces these conditions may also cause it. Wounds, injuries, tuberculosis, syphilis, stricture, etc., are therefore etiological factors. Ulceration and burrowing from the base of mucous diverticuli in the rectum and pelvic colon are said by Cruveilhier (*Anat. path. générale*, Paris, 1849, t. i, p. 594) and Françon (*Th.*, Lyon, 1883-'84, No. 199) to be the point of departure for internal blind fistulas. Perforating tubercular ulcers of the rectum have long been considered the originating cause of the disease. Pathological researches, however, fail to confirm this view, which has been particularly elaborated by Koenig (*Lehrbuch speciellen Chirurg.*, Berlin, 1899, vol. ii, p. 539). If this were the case, there would be usually other ulcers around the internal opening of the fistula, as tubercular ulcers of the rectum are rarely single. As a matter of fact, in the large majority of fistulas, ulcers of the rectum are not present except at the fistulous opening. Thus, in 41 cases of tubercular fistula examined by M. Hartmann (*Révue de chirurg.*, 1894) there were only 2 cases in which there existed ulcerations of the rectum separate from the internal opening of the fistula. Moreover, if the fistula originated in a perforating ulcer of the rectum it would always assume the type of a blind internal fistula at first, and present the symptoms of such, but this is not the rule either in the simple or tubercular types. The discharge from the rectum does not often occur until after the symptoms of abscess have existed for some days—in short, the ulcer develops after the abscess.

The question now arises, If they all originate in abscesses, why do not these heal, and why the chronicity which constitutes fistula? Many theories and conditions have been evoked in the explanation of this fact. It is easy to understand why a complete fistula does not close on account of the constant passage of faecal matters and gases through its tract, thus preventing by mechanical action the agglutination of its walls. Moreover, the constant reinfection of the surfaces by such passages prevents healthy granulation and healing. In internal blind fistula one can also explain why healing does not take place on account of the imperfect drainage and the constant escape of faecal material into it.

These theories, however, do not apply to blind external fistula, in which there is no passage of faecal material or gases into the cavity, and hence no constant irritation or apparent recurrent infection of the walls. The cause has been ascribed to the mobility of the rectal wall which forms a portion of the fistulous tract; the constant motion of a part will prevent its union with another, and there is constant motion of the rectal wall due to respiratory and involuntary peristaltic action. The irregularity of the abscess cavity, the existence of necrotic tissues in different portions of the tract—when the opening is not sufficiently large for thorough drainage, and when these tissues have not been removed by curettage or dissection—may prevent the closure of a blind external fistula. These, however, do not explain those cases in which wide incision, thorough drainage, and the removal of sloughing tissue have been practised, and yet they do not heal, notwithstanding the fact that the most careful and persistent search has failed to reveal any opening into the rectal or anal canals. In such cases Hartmann has suggested the osmotic passage of gases and infecting agents from the rectum through the thin rectal walls into the abscess cavity as a cause of persistent infection and consequent delay in healing. While such a theory is ingenious and possible, it is utterly without proof.

The whole secret of chronicity in blind external fistula lies in two facts: first, in imperfect drainage; second, in persistent reinfection, which may come through an opening into the rectum which has not been found, or through the original tract of infection, the lymphatic channels. Referring to the chapter upon ischio-rectal and perirectal abscesses, it will be remembered that the large majority of these was ascribed to infection from some small lesion in the rectal or anal canals, the septic material being taken up by the lymphatics and carried into the surrounding tissues. The abscess becomes circumscribed owing to a thrombosis of the lymphatic trunks. This thrombosis stops for the time the current of septic material from the original source, but as soon as the abscess opens or is incised, the thrombosis in the lymphatic trunks no longer obstructs the circulation in the distal tracts. Therefore these little lymphatic

vessels, still in connection with the rectal surface, continue their infection of the abscess cavity.

Suppuration extending from the abscess or from the rectal wound may eventually follow along these tracts and enlarge them sufficiently for the admission of a probe, whereas in the original condition they are too small for the passage of either the pus or the probe; and therefore while there actually existed a communication, it was too small for discovery by the ordinary means of research. According to this view the etiological factor in the conversion of an abscess into a fistula is its persistent connection with the rectum or anal canal either through the lymphatic tracts or through a distinct opening.

The repair of abscess cavities depends upon the proportionate production of round cells and their destruction by microbic agents (Quénu). If the production exceeds the destruction, repair will proceed, and *vice versa*. If, therefore, a wound be properly cleansed of infectious material and constantly kept clean, it ought in a general way to heal in due time. Of course one must take into consideration the constitutional condition, the rest and personal attention which a patient can give to his treatment; but, assuming that these are satisfactory, the healing or chronicity of such abscess cavities will depend upon the extent to which they are protected from constant reinfection. The fact that quite a number of perirectal abscesses and subsequent fistulas originate in injuries and ulcerations of the crypts of Morgagni, from which lymphatic absorption and infection take place, explains why the rectum is so often searched in vain for their cause.

These ulcerations may continue after the opening and drainage of the abscess, and unless a systematic examination of all these pockets is made and the ulceration cured, suppuration may persist on account of the fact that the cavity receives through its lymphatic connection with the crypts a supply of pyogenic germs the destructive power of which overbalances the production of round cells, and thus prevents healing. These facts emphasize the importance of searching for the original source of infection, and for any minute communication with the rectal cavity.

Sex.—Ano-rectal fistula is undoubtedly more frequent in males than in females (Bryant, Guy's Hosp. Rept., London, 1861, vol. viii, p. 87; Greffrath, Deutsch Zeitsch. f. Chir., vol. xxxi, p. 18; Quénu and Hartmann, *op. cit.*, p. 180). In 425 cases collected from different sources there were 332 males, 89 females, and 4 children in whom the sex was not mentioned.

The explanation of these facts lies in the greater exposure of men to those accidents which cause perirectal abscesses, in the fact that they are less careful in their personal cleanliness, and in the habitual

overeating and drinking in the male sex—habits which predispose to perirectal inflammations and abscess.

Age.—Fistula may occur at any period from birth to very old age, but it is essentially a disease of middle life. Quénu and Greffrath state that in 147 cases only 4 occurred under the age of eleven years. These figures should not be taken as conclusive as regards the disease in children. The institutions from which these authors obtained their statistics are not hospitals for children; in fact, children compose a very small proportion of the patients in either institution, and therefore the facts do not properly represent the proportion of fistulas in infants. Deran-Borda (Thèse de Paris, 1882, No. 233) and E. Vigne (Thèse de Paris, 1882, No. 187) have gone into this subject somewhat thoroughly, and show that their occurrence in children is considerably more frequent than is ordinarily admitted by surgeons to general hospitals. At the Polyclinic Hospital 6 cases of fistula were treated in children under five years of age during the past five years. The earliest age at which it has been seen was one and a half years.

As to its occurrence in old people, it is still more difficult to obtain statistics. In the Almshouse Hospital of New York there has been a large number of old people affected with fistulas, most of whom had suffered from the condition for many years; one man, aged eighty-one, said that he had had a fistula for over forty years, and suffered no more from it at the time of examination than he had for thirty years past. The majority of fistulas in old people will be found to have originated in middle life.

Constitutional Conditions.—Some fistulas are said to arise from constitutional diseases and specific inoculations; thus there are those which follow attacks of typhoid fever, variola, measles, dysentery, and scarlet fever; also those which arise during the course of Bright's disease, cirrhosis of the liver, diabetes, and rheumatism. If dysentery and typhoid fever are excluded it is a question if any of these diseases have any causative influence in the production of the malady. Ulceration of the rectum may occur during the course of any exhausting disease, but it is nearly always superficial, and the fistulas that result from it are almost invariably submucous tracts running from one ulceration to another. Typical fistula in ano rarely if ever results from such conditions. In typhoid fever and dysentery one may occasionally find a true perirectal abscess due to the infection of the parts by the specific bacilli of typhoid or dysentery through the lymphatic channels, or by the escape of these bacilli into the tissues through ulcerative perforations of the rectal wall; but even this type of fistula is exceedingly rare.

Tuberculosis.—The influence of tuberculosis in the production of fistula is a subject which has been discussed so widely that one scarcely

dares to venture upon it without devoting an amount of time and space altogether out of proportion to a book of this character.

The etiological influence of tuberculosis in the production of fistula is by no means a settled question. Every surgeon admits that a certain number are tuberculous, but whether it is an initial inoculation with tubercle bacilli or is secondary to a focus elsewhere in the body is still a mooted question. Some hold that there is no such condition as primary tuberculosis of the rectum, it being impossible, according to Koch, for tubercle bacilli to reach the rectum through the intestinal canal. On the other hand many competent observers believe that fistula is frequently the primary manifestation of tuberculosis, and that when the disease limits itself to this area it may remain localized for long periods of time. In order to come to some conclusion in regard to the relationship between tuberculosis and fistula it is necessary to look at the subject from two points of view: first, *tuberculosis in the fistulous*, and, second, *fistula in the tuberculous*. Some elaborate statistics have been compiled to determine this relationship, and yet none are particularly satisfactory. Allingham states that 14 per cent of all fistulous cases seen by him were tuberculous. Hartmann, in a study of over 600 cases of fistula, states that 30 per cent were tuberculous; Greffrath, 16 per cent; and Meyer in a private communication states that in Mt. Sinai Hospital of New York, $9\frac{5}{16}$ per cent of all the cases of fistula were tuberculous. In the author's experience nearly 50 per cent of the fistulas that have come under his observation in the Polyclinic, Almshouse, and Workhouse Hospitals have either suffered from tuberculosis at the time or afterward.

There is a much closer agreement among observers as to the percentage of fistulas in the tuberculous, as the following table exhibits:

Taylor (London Lancet, 1890)	1	per cent.
Hartmann (<i>op. cit.</i> , p. 4)	4.91	"
Brompton Hospital Reports	4	"
Douglas Powell (Quénu and Hartmann, p. 181)	5	"
St. Joseph's Home, Caldwell (3,000 cases)	0.9	"
Mt. Sinai Hospital (3,749 cases), Meyer	1.3	"
Almshouse Hospital, New York, tuberculous wards.	2.1	"

In these statistics one observes two classes: institutions in which there are surgical wards, and others in which there are none. It is very clear in the case of the Mt. Sinai Hospital that all the fistulous cases were sent to the surgical side and never reached the medical side, whereas all the cases of general tuberculosis were sent to the medical wards; therefore, the proportion among the tuberculous is very small. On the other hand Hartmann, Powell, and the Brompton Hospital reports deal with a general hospital clientèle. Such institutions take in

very few pulmonary consumptives, whereas they admit all cases of fistula whether they are tuberculous or not; therefore their percentages are unusually high compared to those of St. Joseph's Home, Meyer's general statistics, and those of the Almshouse tuberculous wards. On the whole the true percentage is probably somewhere between the 5 per cent of Powell and the $\frac{1}{10}$ of 1 per cent in St. Joseph's Home. With such facts in view the influence of tuberculosis in the production of fistula is undeniable. The fact that fistula in the tuberculous is so much less frequent proportionately than tubercle in the fistulous, renders it almost impossible to doubt the occurrence of primary tuberculosis in these parts. Modern observers have come to hold to the view that abscesses, ulceration, and fistula of the rectum may be caused by direct inoculation of injuries and abrasions by the tubercle bacilli ingested with the food and carried through the intestinal tract, notwithstanding the observations of Koch. If such facts can be established, if it is positively known that the anal manifestation is the only focus of tuberculosis in the system, and if, as will be shown farther on, this focus is absolutely walled off from any connection with the general system, it will have a bearing of the greatest importance upon the management of such cases.

Syphilis.—Of the influence of syphilis in the production of fistula little positive information is obtainable. Nearly all the cases of fistula attributed to syphilis have been those secondary to stricture of the rectum. In such the fistula is usually a complicated or complex one due to perforation of the rectal wall by ulcerative processes, and the infection of the perirectal tissues subsequent to this. The fistula therefore becomes one of simple infection, and not of a specific nature itself. This might be said more positively if we knew the specific organism of syphilis and could eliminate it by microscopic or culture examinations, but unfortunately there are no means at present by which the presence of such a germ can be proved or disproved.

A number of such fistulas entirely heal, whereas the stricture and specific disease continue. This fact would indicate that the fistula was a complication and not a part of the disease. On the other hand there are fistulas supposed to be simple, inflammatory conditions, which absolutely refuse to heal until the patients are put upon antisyphilitic medication, when they at once assume a healthy granulation, and heal promptly and thoroughly. It is therefore an unsettled question as to how much influence syphilis has in the production of fistula; but with regard to its delaying healing after operations for fistula, there is no room for doubt.

Symptoms.—It may be assumed that the symptoms of abscess have preceded those of fistula at some time more or less remote; that the

abscess has opened either internally, externally, or in both directions; that the acute phenomena have disappeared, and that the condition has assumed a chronic state. From this time the symptoms may be said to belong to fistula, and they will be reviewed as seen in the various types of the disease.

Blind External Fistula.—In this form of fistula, after the inflammatory symptoms have subsided, the abscess instead of healing assumes an inoffensive, painless condition. The discharge decreases and becomes more serous; the tissues become somewhat thickened and brawny about the aperture; there is some itching or irritation, sometimes a slight dragging of the parts upon certain motions, and discomfort from sitting in certain positions; there is rarely, if ever, any absolute pain; the discharge may require the wearing of a napkin or some small dressing, or it may be so limited that it scarcely stains the linen; it may cease for certain periods owing to the temporary closure of the opening; while this continues there will be a feeling of fulness and discomfort in the parts, but these rapidly disappear upon the reopening of the aperture. This opening and closing may go on for indefinite periods, and sometimes the closure may be so firm that the abscess will burrow and open at another portion of the surface, this opening being followed by the same relief as in the first case.

The symptoms during the period of closure are not those of an acute abscess accompanied with chill, fever, and great distress, but they resemble those of the cold abscess. During one of these closures the secondary opening may take place within the rectum and thus form what would appear as a blind internal fistula; but this condition lasts only a short time, as the original opening or another upon the surface is sure to give vent to the collected pus, thus producing a complete fistula.

Palpation will reveal a thick and brawny condition of the skin over the fistulous tract, and generally an induration of greater or less extent beneath it. Deep pressure around the opening will give some pain, and usually results in forcing a drop of sero-pus from the aperture.

There is ordinarily no pain on defecation, and no spasm of the sphincters. In simple fistulas, and even in many cases of the localized tubercular type, the patients remain in the best of health and frequently increase in weight. The rectum presents no abnormalities to the touch or sight except that one can sometimes feel the induration of the fistulous tract through its walls.

Blind Internal Fistula.—The symptoms of this variety are much more obscure. The patient will give the history of rectal ulceration or of having had chilliness and temperature with pain and fulness in the rectum, followed by a discharge of blood or pus which gave partial

relief. The discharge, however, continues, and pain on defecation is present with more or less tenesmus or spasm of the sphincter. If the condition has existed for any length of time, hypertrophy of this muscle may be present. All of these symptoms subside and recur from time to time. The subsidence is associated with an increase of the discharge, and the recurrence with a decrease. Owing to the fact that these fistulas are usually submucous or submuco-cutaneous, palpation around the anus does not ordinarily give to the examiner a sense of tension, swelling, or induration; nor does it produce that acute pain which follows in abscess or blind external fistula.

With the finger in the rectum one may feel sometimes a small indurated tract running upward from the base of the fistula to the opening in the rectum, or if the cavity be only partially emptied of its contents, a boggy, compressible mass may be observed. Ordinarily the opening can be felt and located. Where this can not be done, the use of instruments will be necessary for the diagnosis. For this purpose the conical, fenestrated speculum is by all means the most satisfactory. By it one can bring the aperture into view, and while he presses with his finger upon the lower part of the tract he will be able to see a drop of pus exude from the opening. Having determined such an opening, one can introduce a bent probe into it through the speculum, and by the introduction of one probe after the other, each being bent a little more upon itself, he can determine absolutely the depth and direction of the tract.

Sometimes the small laryngeal mirror may be useful to determine the opening, especially in those cases in which it is situated in the posterior rectal *cul-de-sac*, or when it leads downward from a valve-like opening either in the rectal wall or in one of the crypts of Morgagni.

The introduction of the probe in these cases usually causes an acute pain when it approaches the anal region, and it may be followed by a drop of blood.

Complete Fistula.—Complete fistula is generally more easily diagnosed than either of the other varieties. Aside from the history of abscess there is more irritation, greater spasm of the sphincter, more or less pain on defecation, involuntary escape of gas and fæces, difficulty in maintaining cleanliness, and a constant disagreeable odor to the parts, all of which have a depressing influence upon a sensitive individual, leading sometimes to attacks of hypochondria and even melancholia.

The discharge is greater than in blind external fistula, owing to the fact that the infection is more continuously renewed.

Pain is not a prominent symptom, but it is always present to some extent. The external opening is often tender to the touch; it may be

elevated like a nipple or depressed by cicatricial contraction. The inflammatory symptoms of abscess may sometimes recur owing to the obstruction in the fistulous tract by necrotic tissues or the escape of faecal substances from the rectum. The fistula may also be kept tender by the passage of irritating diarrhoeal stools which cause further infection, and may bring about the formation of other abscesses which open into the first tract, or at other points upon the skin, thus producing complex fistula.

The sphincters in this type of fistula are nearly always spasmodic and hypertrophied. An examination by palpation around the rectum will nearly always elicit an indurated tract leading upward and toward the anus. With the index finger of one hand in the rectum and that of the other outside, one may generally trace this indurated tract to the internal opening in the rectum. This opening can almost always be felt and absolutely determined by touch.

Diagnosis.—Ordinarily when the patient presents himself for the treatment of fistula, the diagnosis has been already made by himself or his friends. To laymen every opening about the anus which discharges pus is a fistula, whether it be acute or chronic. The surgeon, however, must be more explicit; he should not only determine the existence of a fistula, but its character, its origin and its pathological nature. In all cases of fistula the history of injury, discomfort, pain, and fulness about the rectum, with or without constitutional symptoms, can be elicited by careful interrogation. The length of time existing between such symptoms and the examination will determine in a certain number of cases whether the sinus shall be termed an abscess or a fistula. All blind fistulas are practically chronic abscesses; when they have existed for several weeks after having been opened and drained, and show no tendency toward healing, they may be termed fistulas, but the fact that an abscess has existed for weeks with insufficient drainage does not justify the assumption that the condition is one of fistula. Many such will heal at once upon proper drainage and treatment being established. Chronicity, therefore, under favorable circumstances for healing, is the pathognomonic symptom of fistula.

To examine for fistula the patient should be laid upon his left side with the hips elevated, in the exaggerated Sims's posture, and close attention should be paid to each opening and the intervening tract.

The External Opening.—Careful observation should be made of all the external parts. The external opening will appear as an ulceration, a pouting tubercle (Fig. 120), or a small cicatricial depression near to or remote from the anus; sometimes in submucous fistula it appears as a fissure between the radial folds of the anus, and can only be seen by separating the buttocks forcibly; occasionally it will be found closed at the time

of the examination, but when such is the case a small rose-colored or whitish spot covered with a thin cicatrix or mucous-like tissue will disclose its site. This tissue is very fragile, and can be broken by stretching the edges apart, or punctured with the end of a probe. After puncture a small drop of pus will generally exude. In tuberculous subtegumentary fistulas the opening may be at the margin or in the midst of an extensive, ragged ulceration (Fig. 89).

The Tract.—Around the margin of the external aperture, if grasped between two fingers, there will be felt a dense fibrous deposit. By careful palpation one may follow this induration throughout its extent. If



FIG. 120.—EXTERNAL OPENING OF SUBTEGUMENTARY FISTULA.

it goes deep into the perirectal tissues the finger introduced into the rectum will trace it inward and around the anus until its internal opening is reached; sometimes it is necessary to use the fingers of both hands, one being placed in the rectum and pressing downward, the other palpating the tissues around the anus. By this means the indurated tract and its direction can generally be clearly determined, and wherever there is an internal opening this induration will always lead directly or by some circuitous route to it. The tract is not always tubular and direct, for large cavities may interrupt its course, and it may be very tortuous, almost surrounding the anus, but the expert finger can almost always detect the entrance into the rectum.

The Internal Opening.—This opening may be wide and gaping, due to ulcerative destruction; it may assume the form of a small papilla, or it may be in the shape of a depressed cicatricial opening just large

enough to admit the end of a fine probe. It may also occupy the base of one of the crypts. It ought always to be located by digital touch. When it has once been felt in connection with an external opening there is no longer any question as to the existence of complete fistula. To the educated finger irregularities in the mucous membrane, such as ulceration, elevated papillæ, or depressed cicatricial openings, are easy of recognition. When this touch is combined with the existence of a fibrous mass leading from the external opening to the point at which the internal irregularity is felt, the diagnosis is confirmed beyond a doubt.

The probe, therefore, is not necessary in the diagnosis of blind external or complete fistulas. Its use consists in determining the depth and direction of the pockets and sinuses. In certain cases (Fig. 118) it would be impossible to introduce the probe into the internal from the external opening on account of the tortuosity of the tracts; it is only by incising them step by step that one is able to make the probe enter the internal aperture at all. If one depended upon this instrument for diagnosis of complete fistula he would frequently determine them to be of the blind external variety, and operation on this basis would most surely fail. The probe is very useful, however, in the examination of fistulas with openings remote from the anal circumference. In these cases the tract is sometimes so deep and covered by such dense tissues that it is impossible to make out its course by palpation, and while one may satisfy himself by digital examination of the existence of an internal opening, the direction and extent can only be determined by the use of this instrument. It is also necessary in those cases in which the opening is through one of the crypts, for here the valve covers it up and interferes with the touch. The surgeon should therefore have a variety of these, some very fine, others of medium size, and still others large and long; they should all be supplied with flat handles so that one can always tell in what direction the point is extending when it is introduced bent upon itself.

Another method of diagnosis of complete fistulas is that of injecting colored liquids through the external opening. A syringe filled with methylene blue, milk, or some other colored fluid is introduced into the external opening, and the liquid is forcibly injected into the tract. If an internal opening exists it is supposed that the fluid will come out through the rectum. Such will be the case provided the internal opening is not valve-like, in which case the flap may be pressed up against the side of the rectal wall, thus completely closing it, and only a false inference can be drawn from the procedure. If too much force be used the fluid may break through into the cellular tissues around the rectum and thus do harm. The use of the conical speculum to determine the internal opening has been already described.

We have laid great stress upon finding the internal opening, because we believe that it is the most important step in the treatment of fistula. It is the gateway for constant reinfection, and unless it is obliterated we can not expect the parts to heal, however wide or deep our incisions may be.

The diagnosis of blind internal fistula will depend largely upon the symptoms present in the case. These have been detailed above, but it may be worth while to reiterate one particular feature, the remission and recurrence of the discomfort and discharge which are always associated with this type. With the conical speculum one is usually able to see the opening, or at least determine the site from which the pus discharges when pressure is made around the anus. Occasionally, however, there are symptoms of blind internal fistula where the opening can not be determined. In such cases there may exist what is termed a complete intrarectal fistula, which consists in two mucous openings connected by a fistulous tract completely within the anus or rectum; such a condition is rarely seen in the rectum itself except in cases of multiple, tubercular ulceration, where two ulcers are connected by a sub-mucous tract. Within the anus, however, it is not such a rare condition, and has been termed "bimucous anal fistula"; the term complete intra-anal fistula would more accurately describe it.

Complex Fistulas.—In complex fistula, while it may be very easy to find the internal opening, it is not always such a simple proposition to determine which one of the numerous external openings is most directly connected with it. All of them are connected with one general abscess cavity by more or less tortuous tracts, and this in turn is connected with the internal opening by another narrow channel. It is very easy to introduce a probe into this cavity from either the rectal or cutaneous aperture, but sometimes impossible to pass it from one opening to the other. The chief thing to be learned is the course of the tract that leads from the rectum into the abscess cavity; if this is obliterated and the constant reinfection through it stopped, the other tracts can be easily managed. The simplest way to determine this is to open the cavity freely so that the finger can be introduced, and then pass a probe from the rectal opening down upon it. All this should be done at the time of operation, as it requires general anæsthesia. With several external openings in sight and the internal one located by touch, the diagnosis of complex fistula is complete. Flexible bougies, the injection of colored fluids, and various probes are unnecessary to diagnose this condition. The finger does it all.

Anatomical Character.—The surgeon should always determine the anatomical character of a fistula before operating or giving an opinion. The prognosis is very different in the subtegumentary and subaponeurotic types. The distinction, however, is quite simple.

In the subtegumentary variety there is usually a history of very slight constitutional disturbances, perhaps a thrombotic hæmorrhoid or a furuncle; the tract is generally straight, although they sometimes run circularly around the anus (Fig. 121); the induration is not marked; the external opening is patulous and rarely more than $\frac{3}{4}$ to 1 inch from the anus, the internal is rarely above Hilton's line; the overlying tissues are healthy and the discharge is usually very scanty. The induration of the tract or a probe passed through it can easily be felt by the finger throughout its course.

In the submuscular or subaponeurotic variety there is usually a history of injury or abscess with constitutional disturbances; the tracts



FIG. 121.—SUBTEGUMENTARY FISTULA ALMOST SURROUNDING THE ANUS.

run in all directions, and may extend entirely around the rectum; the external opening is a cicatricial depression or pouting tubercle, generally more than an inch from the anus, and bears no constant relationship to the internal: the latter is usually between the two sphincters, but may be much higher; the induration of the tract and infiltration of the surrounding tissues are very marked; it is often difficult to pass a probe from one opening to the other; the muscular or aponeu-

rotic fibers may be felt between an instrument introduced into the fistula and the finger in the rectum; the discharge is often profuse, and may be accompanied by gas and fæcal material. Occasionally these fistulas pass directly through the muscles (Fig. 122); in such cases there is great hypertrophy of the sphincter and marked constipation.

Origin.—It is a matter of importance for the surgeon to determine not only the existence of a fistula and its anatomical character, but also if possible its origin. Many fistulas originate in other organs than the rectum.

A case reported by the writer (N. Y. Med. J., July 1, 1893) showed

the fallacy of concluding that a fistulous tract is connected with the rectum simply because it closely approaches this organ. In this instance (Fig. 123) the fistula almost entirely surrounded the rectum, and opened externally upon the right side at a distance of about 2 inches from the anus. After laying it open and following it first around the right side to the anterior commissure, and then around the posterior commissure and on the left side forward in the perinæum to the juncture of the scrotum, it was discovered that what was apparently an ano-rectal was really a urethral fistula which had no connection whatever with the rectum. An ano-rectal fistula the tract of which is very similar to this is illustrated in Fig. 124.

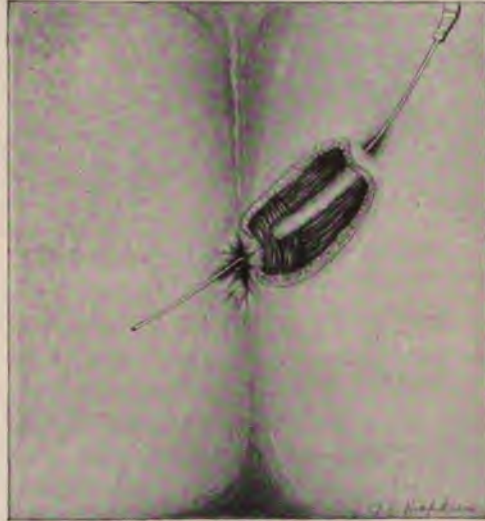


FIG. 122.—STRAIGHT TUBULAR FISTULA PASSING DIRECTLY THROUGH EXTERNAL SPHINCTER.
Drawn from post-mortem dissection.



FIG. 123.—TRACT OF URINARY FISTULA WHICH SIMULATED THE ANO-RECTAL VARIETY.

Fistulas may also originate in a suppurating ovary or broad ligament and open very close to the margin of the anus. These have no connection with the intestinal canal.

Nerosis of the bones of the pelvis, psoas abscess, and tubercular diseases of the vertebræ may all result in fistulous openings around the anus and simulate blind external fistula.

In one interesting case which the writer

saw some years ago, a fistulous tract ran up posterior to the rectum, and the probe impinged upon the mucous membrane at a height of

about $2\frac{1}{2}$ inches; on widening the tract, however, it was found that the condition was due to a dermoid cyst which had ruptured in the retro-rectal space, causing an abscess in this location. The remains of the cyst were removed, and what had been supposed to be a chronic fistula rapidly healed.

Where the fistula originates in perforation or stricture of the rectum, one should be able to determine these facts by digital and instrumental examination. When it is due to infection through the lymphatic channels, the abrasion or ulceration through which the infection first occurred may heal and leave so slight an evidence of its existence that it will be impossible to determine the origin. The patient's previous history as to diseases of the urethra, bladder, or generative organs should be investigated. Wherever a urethral stricture has existed, a deep

urethritis, or evidence of pelvic inflammation in women, one may suspect the origin of a fistulous tract to be other than intrarectal.

In a case of perirectal abscess due to perforation of the deep urethra with a small filiform bougie, there was never any urinary extravasation, and yet within a few hours after the intro-



FIG. 124.—OUTLINE OF TORTUOUS ANO-RECTAL FISTULA.

duction of the instrument a chill and fever followed, and a large abscess developed, the symptoms being chiefly referred to the rectum. A deep perineal incision was made, and a quantity of pus let out from an abscess which seemed ready to burst into the rectum. The fistula that resulted from this abscess continued for some time, but was finally cured by drainage and thorough dilatation of the strictured urethra.

Fistulas which result from carcinoma and syphilitic stricture of the rectum usually occur in such late stages of the disease that they are a matter of small importance compared with the original disease. If the diagnosis of cancer has not been made and proper treatment instituted before the occurrence of the fistula, one may practically say that it is useless at this time to attempt any radical interference. The origin of the fistula, therefore, will always have an important bearing upon its treatment, and search for the same should never be neglected.

PATHOLOGICAL NATURE OF FISTULA.—Having determined the presence, anatomical character, and origin of a fistula, its pathological nature should be learned, as it is impossible to decide upon the treatment or give a correct prognosis until this has been done. In those cases due to carcinoma or fibrous stricture, only radical operations can promise any permanent relief. On the other hand, those due to simple infection and inflammatory processes may all be cured by minor procedures. The rectum should be thoroughly searched for evidences of malignant or specific disease; and the history should be investigated with regard to typhoid fever, dysentery, and pneumonia, as abscess and fistula may follow all of these conditions. The important pathological factors, however, are tuberculosis, syphilis, and cancer.

Tubercular Fistula.—To distinguish tubercular from non-tubercular fistulas is said to be very easy, but it requires exact and scientific examination. While there are certain general characteristics of tubercular fistula, one may be easily misled, when it is the primary manifestation of tuberculosis, by the absence of constitutional and general symptoms.

The external opening in this variety may be large or small. Where it originates in a perianal tubercular ulcer, it will appear as an irregular, wide aperture with red undermined edges, and a base of pale, proliferating granulations. Where it originates in infection carried along the lymphatic channels that results in an abscess which opens upon the skin, the external aperture may be surmounted by a small, elevated, nipple-like tubercle with an opening in its center. Always in such cases, however, the skin about the tubercle will be undermined.

Some stress has been laid upon the long silky condition of the hair around the anus, the club-shaped finger-nails, and the general physiognomy of the patient, his voice, complexion, etc. All these symptoms belong to constitutional tuberculosis, but they do not prove the fact that the fistula itself is tubercular. One may occasionally see a simple fistula in a tuberculous individual. Loss of flesh may be produced by any irritating disease of the rectum, whether it is fistula, ulceration, or fissure; all catarrhal diseases of the rectum and sigmoid and all inflammatory conditions of the lower end of the intestinal canal interfere with the digestion, appetite, and reparative processes, and may result in loss of flesh, so it is not a conclusive symptom of the tubercular nature of a fistula.

The discharge from a tuberculous fistula is generally small in quantity, thin, and milky white; it is rarely a thick, creamy pus. The induration about the tract of tuberculous fistula is greater, as a rule, than that about the simple varieties.

Pain and sensitiveness to touch are markedly absent in tubercular fistula, but this is not invariably so. Night-sweats, interrupted sleep,

and evening elevation of temperature may be seen in these cases; but when they are present, genito-urinary or pulmonary tuberculosis is generally found to exist. While all these symptoms may lend probability to the tubercular nature of a fistula, there is but one absolutely certain method to diagnose it, and that is by microscopic examination and culture tests. Examination of the discharges for the bacilli is often misleading; very frequently one fails to find them in the pus, whereas they may be abundant in scrapings of the granular tissue from the fistulous tract, or in the perifistulous tissue after it has been dissected out. Heredity and personal history, the general phenomena and local appearance of a fistulous opening, will frequently enable one to predicate the existence of tuberculosis, but the fistula itself can not positively be called tubercular without the corroborative evidence furnished by these means. It is important, therefore, that one living at a distance from laboratories should prepare himself to make such examinations, and be able to decide with a certain degree of promptness the pathological nature of any fistula with which he has to deal. One should not presume upon a negative result in physical examination as proving the non-tubercular nature of fistula, nor should he conclude that it is tubercular because there is a hereditary taint. The fistula should be judged from its own tissues. Probabilities should not be relied on where knowledge is obtainable. In tuberculosis and carcinoma this can be done, and no fistula should be treated without it. In syphilitic fistula the histological examinations are not so certain, though they may confirm the clinical evidences.

The diagnosis of urinary fistula may be made from the history of the case, the character of the discharge, the preponderance of urethral symptoms, the induration in front of the transversus perinei muscles, and may be corroborated by the administration of a capsule of methylene blue by the mouth, as after urination the fistulous tract will be stained blue.

Prognosis.—The probable outcome of any given fistula will depend upon three conditions: first, the pathological nature of the fistula; second, the constitutional condition of the patient; third, the amount of tissue involved.

It is customary in books upon rectal diseases and general surgery to describe fistula as a condition most amenable to treatment. As a matter of fact, however, a very large percentage, if not a majority of the cases of fistula operated upon in hospitals and treated by general surgeons, are failures so far as cure is concerned. A search of the hospital records reveals the fact that while nearly all the cases of fistula treated are said to be improved, less than 45 per cent out of 2,196 cases collected are even claimed to have been cured. These statistics do not distinguish between the different varieties anatomically or pathologic-

ally, and therefore no positive conclusions can be drawn from them. It is reasonable to suppose, however, that those of the simple subtegumentary type were all cured. Assuming this to be true, the percentage of failures in the other classes will be largely increased. If these patients had been cured there is no doubt that they would have been entered so upon the hospital records, and therefore it is concluded that the treatment of this condition in general hospitals is far from satisfactory.

There is no more difficult or disappointing condition to treat, and in giving a prognosis one must always bear in mind the three conditions mentioned above. Why fistulas fail to heal has been already discussed.

Cases of spontaneous cure have been reported by Bennett, Allingham, Bodenhamer, Edwards, Ribes, Velpeau, and others. Bodenhamer (*Med. Record*, N. Y., 1891, vol. i, p. 254) has related a case in which he examined the patient and determined the existence of a complete ano-rectal fistula but instituted no medical or surgical treatment. The patient died from pneumonia about one year after this examination, and the autopsy showed a simple cicatricial cord throughout the old tract measuring about $3\frac{1}{2}$ inches. It had thus been obliterated without any treatment whatever.

The writer has seen 2 cases of complete subtegumentary fistula heal within a short period after examination with a probe. In these cases the tract had existed in one case three weeks, and in the other about two months. The introduction of the probe seemed to start up a healthy granulation, and thus induced healing. A number of cases of this kind has been reported.

While such facts are interesting, it would be trifling with a patient's confidence to hold out any hope of such a result except in the rarest instances. The length of time required to cure a fistula is very variable. When it can be dissected out and the wound sutured, if primary union takes place the condition will be cured in about two weeks; but when it is treated by the open method, the time varies from two weeks to several months; three to six months is no unusual time for the healing of extensive fistulas, even where the operation has been perfectly performed. While the length of treatment necessary can not be predicted in any given case, eventual cure can be confidently promised in uncomplicated, benign, and non-tubercular fistulas. So far as life is concerned, if we except the malignant type, the prognosis is always good, even in the tubercular variety, if unwise interference is avoided. This brings up the subject of the advisability of operating in such cases.

Operations in Tubercular Fistula.—Here again the distinction is made between a tubercular fistula and a fistula in the tuberculous. It seems unnecessary to discuss the question of radical operation for fistula in well-established cases of pulmonary tuberculosis. Where it is of the

complex variety and associated with much pain and great discharge, thus occasioning exhaustion and excessive wear upon the nervous system, a certain amount of intervention (just sufficient to relieve these symptoms) may be justified, but it should not be undertaken with the hope of curing the fistula. The majority of patients in this condition will succumb to the pulmonary disease before healing of the local lesion can be obtained. It may be set down, therefore, as an axiom that fistulas in well-developed cases of pulmonary tuberculosis should be interfered with as little as is compatible with local comfort. They usually cause very little disturbance if properly drained, and the shock consequent upon operations, the loss of blood however slight, the influence of general anæsthesia however skilfully administered, add nothing to the strength of the patient. His well-being in this disease depends altogether upon his power of resistance to the invasion of the bacilli. Whatever weakens this power of resistance decreases his hold upon life, and should be avoided as far as possible. Operations upon this class of cases have brought the operative treatment of fistula into disrepute, and one should therefore, as a rule, abstain from them in cases of established pulmonary, genito-urinary, or intestinal tuberculosis.

In the matter of tubercular fistulas, however, the subject is approached from another point. Here there is a localized tuberculosis, and it is a question as to whether these foci of disease can be eradicated or not. If the radical removal of the infected focus is feasible, no surgeon would hesitate for a moment to say that it should be done as quickly as possible, provided that the patient is otherwise healthy. Formerly, operations upon fistula were opposed by many surgeons on the ground that they were salutary in that the discharge carried off the infectious germs; that the bacilli circulating in the blood found at this point a convenient exit from the body, and that the closure of this would only dam them up in the system and thus cause infection elsewhere. With the modern views of pathology such a doctrine is no longer tenable. There is no reason to suppose that a purulent discharge from a fistula in ano is more salutary than one from tubercular glands or bones, and yet every surgeon to-day advocates the removal of these. Radical removal, however, and not partial, is what is done in these cases. For some years the author has opposed the open operation for tubercular fistulas upon the ground that an incision into the perifistulous tissues only opens the channels of absorption to infection by the tubercle bacilli present in the tract; and if a tubercular fistula must be operated upon by the simple method of incision it had far better be left to its own course.

If one will refer to the section upon the pathology of tuberculosis he will observe that around these fistulous canals, outside of the lining

layer of granulation, there is a gradually increasing fibrous or cicatricial wall throughout their extent (Fig. 125). *It will be observed also that the farther one passes from the canal outward into this cicatricial tissue the fewer are the tubercle bacilli and giant-cells, and they disappear altogether in the densest portion; this condition exhibits an effort upon the part of Nature to protect herself against the invasion of the pathological germs by a well-defined, limiting wall, which, if the fistula be properly drained, will limit the disease in the large majority of instances, at least for long periods. Break down that wall by incision or deep curetting, and the lymphatic circulation is opened for the admission of this virulent bacillus.* These facts can not be disputed, but many competent surgeons and writers still advocate this method of operation because a large number of supposed tubercular fistulas have been cured by it without the development of generalized tuberculosis. In the large majority of these cases the tubercular nature of the fistula has not been demonstrated. But, admitting that all the

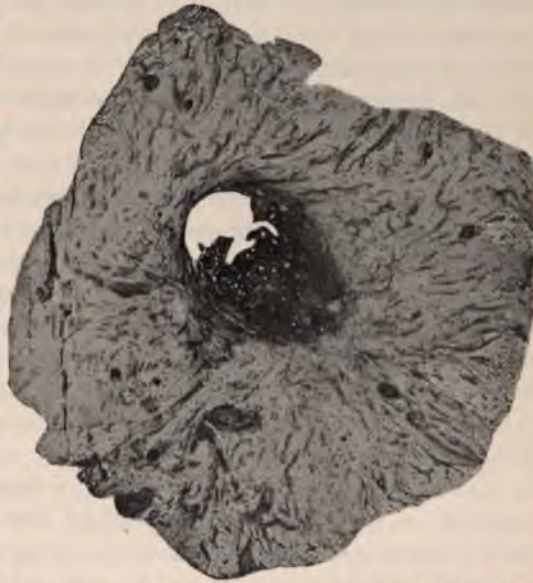


FIG. 125.—TRANSVERSE SECTION OF TUBERCULAR FISTULA
(PHOTOMICROGRAPH).

cases reported were tuberculous, they do not disprove the possibility of generalization taking place, and the relief obtained has not justified the risk. Hartmann's 196 cases do not prove anything contrary to this theory, for he either dissected out the entire tuberculous focus and united the healthy tissues by sutures, or he opened the fistulous tract with a Paquelin cautery, thus sealing up the lymphatics and destroying the tubercle bacilli by cauterization with a platinum knife heated to a white heat. According to his own statements the cicatricial wall was never broken down, nor were the healthy perifistulous tissues opened even by the heated knife. These are very different procedures from laying the parts open and incising the fibrous wall in all directions with a knife; they attempt to remove or destroy the pathological element entirely, and this is in keeping with our proposition.

On the other hand, there are a certain number of positive facts which show the danger of laying open these tubercular fistulas by the knife and curetting their cicatricial walls, as is advised in the operation of Salmon. The writer himself has seen five cases in which tuberculosis either of the lungs or of the peritonæum rapidly followed operations for tubercular fistulas. In one case an Italian boy, who had suffered from a fistula for over two years, was brought to the Polyclinic Hospital November 10, 1897, and was examined by Dr. Page, one of the most expert diagnosticians of this city. No evidence whatever of pulmonary tuberculosis could be detected. He had no kidney, liver, or bladder symptoms which would indicate involvement of these organs. The fistula was a typical tubercular one in its appearance, and consisted of a straight, narrow canal leading from a point about 1 inch from the margin of the anus, upward and inward through the external sphincter and the mucous membrane into the rectum about $\frac{1}{2}$ an inch above the ano-rectal line. Tubercle bacilli were found in granulations scraped out of the tract. The fistula was laid open, curetted, and cauterized with Calvert's carbolic acid. The cicatricial tissue surrounding the tract was then incised in several directions in order to hasten its absorption and to establish healthy granulation. The wound granulated and proceeded to heal as promptly as in ordinary fistulas. At the end of six weeks, however, the patient developed acute pulmonary tuberculosis and died a little over four months after the operation. In the meantime the fistula had perfectly healed.

Another instance was in a patient referred to the writer by Dr. Sherwell, of Brooklyn. He had suffered from irritation of his rectum for several months; there was always a certain amount of discharge, but never any external opening which could be discovered; the condition gave him no pain except after fecal passages, which brought on symptoms of fissure in ano. An examination of the lungs, kidneys, bladder, prostate, and the other organs failed to reveal any evidence of constitutional disease. The rectum and sigmoid showed nothing pathological save a small ulcer in the posterior commissure about $\frac{3}{4}$ of an inch from the cutaneous margin. From this ulcer there extended downward and outward a fistulous tract to the extent of about $\frac{1}{2}$ an inch. The ulcer was crenated and irregular in shape, the edges undermined, and discharged a scant sero-purulent fluid in which no tubercle bacilli could be found. The fistulous tract and the base of the ulcer were indurated but not nodular.

He was admitted to the Polyclinic Hospital on October 5, 1900. On October 6th an operation was performed by first incising and then dissecting out the ulcer and fibrous tissue. As the inflammatory process did not appear tubercular, and was very shallow, it was concluded that

the patient would suffer less from spasm of the sphincters if the wound were left open to heal by granulation. He never had an unfavorable symptom while in the hospital, and on October 13th the wound looked so healthy and the patient felt so comfortable that he was allowed to go home, with instructions to present himself for observation occasionally. On October 16th he felt a sensation of chilliness and malaise, and later he was seized with a distinct rigor. From this time on he was never without some temperature; he rapidly failed in strength, and finally died from tubercular peritonitis on January 5th. The patient, according to his doctor and family, had never had a symptom of peritoneal trouble before this operation. Microscopic examination of the specimen removed revealed no tubercle bacilli, but there were some giant-cells surrounded by embryonic tissue which the author believes proved the tubercular nature of the ulcer.

A third case, W. D., aged twenty-seven, presented himself at the clinic on January 2, 1901, with the history of having suffered from a perirectal abscess some two months previously. This had failed to heal, and caused him considerable annoyance. Examination showed the existence of a horseshoe fistula opening externally upon one side and entering the rectum at the posterior commissure about $\frac{1}{2}$ an inch above the margin of the anus. The fistulous tract upon the opposite side was not open externally but discharged through the rectal opening. A careful examination was made of the patient's lungs, throat, kidneys, bladder, and prostate with negative results; he had no temperature, no cough, and no symptom of pulmonary disease at the time he was admitted to the hospital. The discharge from the abscess was examined by the microscope and no tubercle bacilli were found; the culture test was not made. An effort to reduce the discharges by irrigation was unsuccessful, and therefore it was advised that the tract be opened. This was done February 1, 1901, under the strictest antiseptic precautions. The parts were dressed with ichthyol and glycerin after having been washed out thoroughly with bichloride solution. Bacilli were found in a section of tissue removed at the time of operation.

No unusual symptom followed save a slight elevation of temperature during the first twenty-four hours. After this the patient felt perfectly well and began to improve in his looks, appetite, and general condition. In four weeks the wound granulated and was filling up, but the patient began to lose his appetite and feel exhausted, especially in the morning. On February 10th he had a marked hæmoptysis which nearly cost him his life, and from that time forward he rapidly developed tuberculosis of the right apex with all the concomitant symptoms. At the same time under antiseptic dressings and treatment the fistulous wound on one side practically healed, but on the other, after healing, it broke down and

had the typical appearance of a tubercular ulcer. He was taken from the hospital and it was reported later that he died within six months.

It may be said that these cases are accidental, and that the constitutional symptoms would have manifested themselves had no operation been done, but there is no proof of this. In the first case the patient had carried his fistula for two years without any pulmonary implication, and yet developed it within a short time after operation by the open method. In the second case the patient had suffered from his rectal ulceration or fistula for over six months without any constitutional implication, and yet he developed tubercular peritonitis within two weeks from the time of the open operation. In the third case the period during which the patient had suffered from fistula was no doubt brief, but at the same time it was considerably longer than that between the operation and the development of the pulmonary symptoms.

Quite a number of patients suffering from pulmonary tuberculosis have been seen who are very positive that they never had any cough or pulmonary affection until after operative interference with their fistulas, and it is well known that the above cases can be supported by many others reported in medical literature. The results, therefore, do not justify the risks of open incision.

Where the tubercular fistula can be entirely removed, and the wound closed by immediate suture, the probabilities of complete cure are very encouraging; but when the fistulous tract is so deep and tortuous, or so great in extent that immediate closure is impossible, operation by the heated knife is to be preferred. In the majority of instances the patient will be more benefited by providing necessary drainage and cauterizing the lining membrane of the fistulous tract than by laying it entirely open; but even with the cautery the surrounding cicatricial wall should not be broken down unless complete excision and immediate suture can be practised.

TREATMENT.—The treatment of fistula consists in the obliteration of the chronic, suppurating tracts, either by the process of granulation or by excision with immediate suture. The first method is that which is generally employed. The means of inducing this granulation may be described as the conservative and radical.

Conservative or Non-operative Methods.—By these terms we do not mean a method without any incision; every fistula is practically a chronic abscess, and it is hopeless to attempt to cure them without establishing complete drainage; an incision to accomplish this is therefore always necessary.

In simple, blind external fistulas, complete drainage with curettage or cauterization of the tract and dilatation of the sphincter will always result in a cure without further operative interference. Where it does

not, one may very reasonably conclude that there is some connection with the rectum through which reinfection is taking place, or a pathological condition of the fistula itself, which destroys healthy granulation. In a number of blind external fistulas cure may be effected by distending the cavity with a saturated solution of nitrate of silver (960 grains per fluid ounce), and after this has remained for two or three minutes the parts are cocainized, the opening is enlarged so as to give perfect drainage to the cavity, and the sphincter is stretched gently either with the fingers or with the rectal dilator.* Thorough dilatation of this muscle is better, but it can not ordinarily be accomplished without general anaesthesia. By the use of nitrous-oxide gas or ethyl chloride it is possible to perform this operation in the clinic upon walking cases, but in private practice one would scarcely dare give even these general anaesthetics and allow the patients to go home immediately afterward.

Bennett states that he has cured a large number of complete fistulas by the injection of concentrated solutions of nitrate of silver into them, and Goodsall and Miles advocate this method of treatment in all cases in which the inner opening is above the internal sphincter. The distention of the cavity by the solution of silver should always be followed by the enlargement of the external opening in order that the necrosed tissue and increasing discharge due to that cauterant may have a free outlet. Formerly it was a practice to inject these tracts with equal parts of iodine and carbolic acid, which gave some very satisfactory results. Pure tincture of iodine and tincture of rhatany, solutions of copper sulphate, the solid stick of nitrate of silver, and many other cauterizing agents have been employed from time immemorial in this method of treatment. On the whole, however, the saturated solution of nitrate of silver is the most satisfactory. It is better than the solid stick, because it reaches all the diverticuli and tortuous tracts, whereas the stick only applies itself to the accessible portions of the abscess cavity, and it is very likely to break off when it is introduced into a deep tract. In narrow, subtegumentary fistulas, both of the complete and blind external variety, cures may be effected by the introduction of a probe upon which nitrate of silver has been fused. The discharge and irritation are increased for a few days following this treatment, after which healthy granulation springs up and the tract becomes obliterated. After the injection or application of the nitrate of silver, the slough which it produces will all come away in about ten days, and ordinarily a healthy granulation will be established. If this is not the case, the application should be repeated. Where the granulation is established, however, the applica-

* Powell advocates the use of pure carbolic acid instead of nitrate of silver, and claims to have obtained excellent results from it (*Amer. Surg. and Gynaecol.*, April, 1902).

tion should not be repeated for two or three weeks. It may be necessary to inject the solution three or four times at such intervals before a cure is accomplished.

When the fistula is of the complete variety, it is well to inject a little sweet-oil into the rectum before the nitrate of silver is introduced into the fistulous cavity, in order to prevent the drug from irritating the mucous membrane if it should pass through into the intestine. Good-sall and Miles, whose large experience gives weight to their opinion,



FIG. 126.—ALLINGHAM'S LIGATURE-CARRIER.

in speaking of this method of treatment for fistulas opening into the rectum above the internal sphincter, say: "When after repeated applications the sinus still remains unhealed, it is better to leave it alone than to incur the risk of probable incontinence by the division of the internal sphincter for the cure of the fistula. In fact the patient should be urged to tolerate the persistency of his fistula rather than take the risk of loss of the power of control over the contents of the rectum." This is undoubtedly a too conservative view; in cases in which radical excision with immediate suture is possible, there is no reason why the internal sphincter should not be just as successfully sutured as the external. The advisability of testing the methods of local treatment before resorting to an operation which involves the cutting of the sphincters can not be contested; they not only succeed in many cases, but they possess the advantage of finally decreasing the amount of discharge and reducing the size of the fistulous tract to such an extent that, if they fail to cure, the parts are in a much better condition afterward for radical operation. In the treatment of complete fistulas by this method, it is important that the stools be kept well formed, because if thin and watery they will escape through the internal opening and prevent healing.

It is the practice of certain itinerant specialists to wash out the abscess cavity with peroxide of hydrogen until the effervescence caused by it has ceased. After this they irrigate the fistulous cavity with a solution of bichloride of mercury, carbolic acid, or nitrate of silver, and repeat this treatment every second or third day. When the discharge has been largely controlled, they dilate the mouth of the fistula with forceps or lay it open under the anæsthetic action of cocaine, and thus obtain free drainage. The method is rational, and there is no doubt that they succeed in curing a great many cases by this method.

Where these conservative methods fail to effect a cure after six or eight weeks' trial one should then attempt radical operation. Before

doing this, however, in fact before attempting any treatment whatever, one should satisfy himself absolutely with regard to the pathological nature of the fistula, and if tuberculosis, syphilis, or malignant disease exists, he should be guided by the principles laid down in the preceding section of this chapter.

The Ligature.—The treatment of fistulas by the use of the ligature is classed by many among the conservative or non-operative methods. The only ground for this is in the fact that the cutting is done without a knife and there is no hæmorrhage. It accomplishes exactly the same division of tissues as is done by incision, only in a much slower and more painful manner. It has been employed since the time of Hippocrates. Silk, linen, and elastic threads have all been used, but at present only the rubber ligature is employed; this was first utilized for this purpose by Lee and Holthouse; Dittel, of Vienna, afterward employed it, and Allingham and Bodenhamer adopted the method after him.

The principle upon which the method rests consists in the cutting through of the overlying tissues by the continuous contraction of the elastic thread. It was at one time supposed that healthy granulation was established in the fistulous tract and followed the ligature out as it cut its way through by slow attrition, thus obliterating the tract at the same time. This claim has been abandoned, however, and all who employ this method now use the small, round, solid-rubber ligature. It is passed through the fistulous tract either with forceps or by a specially devised instrument (Fig. 126) known as the ligature-carrier. Where the fistulous tract passes beneath the skin an incision should be made through this tissue, for where this is not done the pain is almost unbearable.

Having passed the ligature through the fistula, a small metal shield or perforated shot is passed over the two ends and fastened by pressure with a strong forceps while the rubber is fully extended (Fig. 127). The

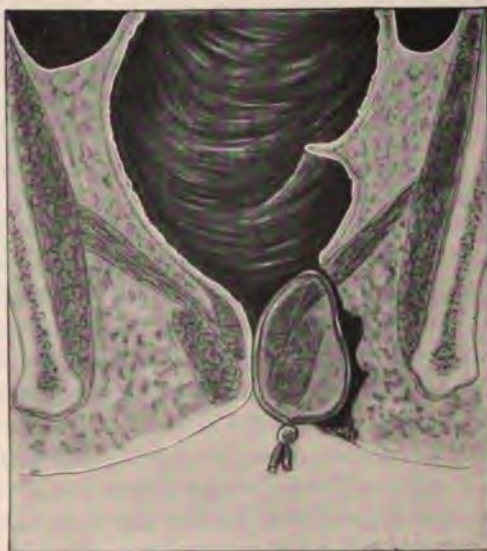


FIG. 127.—LIGATURE PASSED THROUGH FISTULA AND SECURED.

advantages claimed for this method are that it occasions little pain, does not confine the patient, is free from the dangers of hæmorrhage, and a certain number will submit to it who absolutely refuse to have any cutting operation done. Allingham says: "Those who find any difficulty in getting the ligature to cut quickly and painlessly are ignorant of the proper method of applying it"; but unfortunately he does not give any description of this proper method. In the author's experience it has proved successful in curing the few cases in which it has been applied; but, so far as the patient's going about with it or suffering no pain is concerned, the claims of its advocates can not be substantiated. The experience of every patient that has been treated by this method is that they have suffered greatly and often been confined to their beds while the ligature was cutting through; in two cases it has been necessary to remove it on account of the pain. The only real advantage which the method seems to possess over that of incision consists in the absence of hæmorrhage. With the numerous instruments at one's command by which bleeding can be controlled, this recommendation carries little weight except in cases where the internal opening is very high in the rectum. One never sees at the present day uncontrollable hæmorrhage in operations for this condition; but, for the sake of argument, admitting that the ligature does obviate this possible danger, this advantage is more than counterbalanced by the objections to it.

In its employment no antiseptic precautions are taken, and there is no guard against infection of the freshly cut tissues from the bacteria always present; it is followed by a dense, hard cicatrix; it only accomplishes after days what can be done with a knife or thermo-cautery in a few moments; and finally, after the fistulous tract has been cut through by this method, it will often be necessary to lay open and enlarge lateral tracts with the knife or scissors. On the whole, therefore, if the tissues intervening between the rectum and the fistulous tract are to be cut through at all, it seems preferable that it should be done as rapidly as possible under antiseptic precautions and circumstances which will allow the whole suppurative tract to be laid open and treated at one time without having the operation divided into two or three sittings.

If the application is technically carried out and the ligature always passed through the internal pathological opening, there is no doubt that it will result in a cure in the large majority of cases. *The finding and laying open of the pathological tract leading into the rectum is the secret of success in the treatment of fistula, whether it is done by the ligature, knife, écraseur, or cautery.* It is difficult, sometimes impossible, to trace long, tortuous tracts with the ligature carrier, and puncturing the rectal wall

at the highest point of the cavity so as to make a way for the thread is sure to result in failure here, just as it does in operation by incision, because a part of the fistula is left untouched (Fig. 128).

It has been claimed that faecal incontinence is much less likely to occur from this method than from operation by incision. Incontinence depends upon the amount of muscular tissue cut and the imperfect apposition of the fibers when they reunite. If the muscle is cut squarely across by a sharp knife it will be less likely to occur than if it is done by the crushing process of a ligature, for the width of the cicatrix will be less. There is neither fact nor reasonable theory to substantiate this claim for the ligature.

The writer is well aware of the fact that a number of fistulas have been cured by the ligature which had been unsuccessfully operated upon by incision. The explanation



FIG. 128.—FISTULA IN WHICH THE INTERNAL OPENING (A) IS IN A DIFFERENT QUADRANT FROM THAT IN WHICH THE ABSCESS CAVITY (B) IS NEAREST THE RECTAL WALL, AND SHOWING HOW PERFORATING THE WALL AT THE LATTER POINT AND INCISING THE GUT DOWN TO THE ANUS BY LIGATURE OR KNIFE WILL LEAVE A PART OF THE PATHOLOGICAL TRACT UNTOUCHED.

of these cases lies simply in the fact that the operators found the pathological opening and cut it through with the ligature. Had the original operators found this orifice and cut it through with the knife, the operations would have been equally successful. It is simply a question here to find and remove the source of infection by laying open and draining the entire pathological tract.

In those cases where the internal opening is 3 to 4 inches above the sphincter muscle, the elastic ligature is a safe and reliable method of laying open the tract. The advisability of opening such a tract at all, however, is by no means settled. As quoted above, Goodsall and Miles absolutely oppose such an operation; Quénu and Hartmann believe that incision is a dangerous procedure under such circumstances; they hold that complete excision with immediate suture is preferable, and the author agrees with them.

Fistulotomy.—One other conservative method of treating fistulas should be mentioned. It consists practically in scarifying or incising

the walls of the fistulous tract. It may be done with a blunt-pointed tenotome or the fistulotome of Mathews (Fig. 129). Fistulotomy is applicable only to comparatively straight and narrow fistulas. It is based on the same principle as internal urethrotomy, i. e., an instrument carrying a concealed knife is introduced to the deepest portion; the knife is then thrust out and with a quick motion it is withdrawn, thereby incising



FIG. 129.—MATHEWS'S FISTULOTOME.

the walls of the fistula. This being done frequently scarifies the tract in all its circumference. The operation may have to be repeated several times before a cure is obtained.

The claims made for this procedure, that it dissipates fear, avoids hæmorrhage, does not involve the sphincter, and requires no detention from business, are chimerical and likely to mislead the inexperienced. Blind incision into vascular areas can not possibly be free from the danger of hæmorrhage, and being made through infected tissues it is also likely to induce sepsis. No adequate drainage is established by it, and it may be followed by burrowing or collateral abscesses. Its field is very limited, it requires a special instrument, and, finally, its results are not comparable to treatment by nitrate of silver, because it does not improve the condition of the parts for radical operation if this should become necessary.

Operative Treatment of Fistula.—Of the operative methods, the three which deserve consideration are *incision*, *excision*, and *excision with immediate suture*.

Each of these should be undertaken with the most perfect surgical technique. The patient should be as carefully prepared and the rules of *antisepsis* as perfectly followed as in any major operation. Antiseptic methods are employed here because the field is already infected and asepsis is impossible.

The Preparation of the Patient.—The best results will be obtained in those cases in which the fistula has been treated by peroxide of hydrogen and nitrate of silver until the purulent discharge has practically ceased and the cavity contracted as much as possible. When the time and circumstances of the patient permit, this should always be carried out. The actual preparation of the patient for operation is practically the same in all the different methods. The bowels should be thoroughly cleaned out and the patient put on a limited nitrogenous diet thirty-six hours before the operation. Purgation should have ceased entirely before the operation is undertaken.

Along with the preparatory treatment one may institute an attempt at intestinal antiseptics by the administration of beta-naphthol, salol, boric acid, or sulpho-carbolate of zinc. While it is impossible to obtain absolute asepsis of the intestinal tract, there is no doubt that cases treated by this preliminary preparation have less intestinal disturbance and sepsis than those operated upon without it. On the evening before operating a large soapsuds enema should be administered, and when this has been passed the perianal region should be carefully shaved, scrubbed with green soap, and dressed with absorbent gauze moistened in a solution of bichloride of mercury (1 to 2,000). This dressing should be kept moist and retained *in situ* until the operation begins. Two hours before the operation itself an enema of about 1 pint of 25-per-cent peroxide of hydrogen solution should be given.

The anæsthetic employed will depend upon the condition of the patient and the extent of the fistula. Where it is proposed simply to incise it, the parts may be anæsthetized by the hypodermic injection of cocaine; in the majority of subtegumentary fistulas this is all that will be necessary. In cases where there are extensive fistulas that require large dissection and dilatation of the sphincters, general anæsthesia is much more satisfactory. Where it is not contraindicated by cardiac conditions, chloroform is preferable to ether in operations upon the rectum on account of the slight amount of nausea and retching which follow it. Ethyl chloride or kelene is an excellent anæsthetic for short operations, and as an adjuvant to the administration of ether it is very useful, but it is not satisfactory in extensive operations on account of the fact that it does not relax the muscles sufficiently.

A very satisfactory method is spinal cocainization, because there is less oozing from the vessels, and after the first few minutes when nausea exists the patient is more quiet, the sphincter muscles more relaxed, and there is absolutely no pain; furthermore, in this method of anæsthesia the rectum sometimes becomes insensitive before the feet and legs. No vomiting or straining to dislodge the dressing follows it, and the analgesic effect continues for several hours afterward, thus contributing to the comfort of the patient. There is generally some headache on the following day, but this is not very severe. The remote effects of this method have not yet been determined, and consequently it is not recommended unconditionally.

After the patient has been anæsthetized the sphincters should be thoroughly stretched. By this means whatever fluid or faecal material is retained in the rectum can be removed and the organ cleansed. At the same time any ulceration or internal fistulous opening can be seen, and the operation will thus be simplified. It is important that the

On the other hand, there are a certain number of positive facts which show the danger of laying open these tubercular fistulas by the knife and curetting their cicatricial walls, as is advised in the operation of Salmon. The writer himself has seen five cases in which tuberculosis either of the lungs or of the peritonæum rapidly followed operations for tubercular fistulas. In one case an Italian boy, who had suffered from a fistula for over two years, was brought to the Polyclinic Hospital November 10, 1897, and was examined by Dr. Page, one of the most expert diagnosticians of this city. No evidence whatever of pulmonary tuberculosis could be detected. He had no kidney, liver, or bladder symptoms which would indicate involvement of these organs. The fistula was a typical tubercular one in its appearance, and consisted of a straight, narrow canal leading from a point about 1 inch from the margin of the anus, upward and inward through the external sphincter and the mucous membrane into the rectum about $\frac{1}{2}$ an inch above the ano-rectal line. Tubercle bacilli were found in granulations scraped out of the tract. The fistula was laid open, curetted, and cauterized with Calvert's carbolic acid. The cicatricial tissue surrounding the tract was then incised in several directions in order to hasten its absorption and to establish healthy granulation. The wound granulated and proceeded to heal as promptly as in ordinary fistulas. At the end of six weeks, however, the patient developed acute pulmonary tuberculosis and died a little over four months after the operation. In the meantime the fistula had perfectly healed.

Another instance was in a patient referred to the writer by Dr. Sherwell, of Brooklyn. He had suffered from irritation of his rectum for several months; there was always a certain amount of discharge, but never any external opening which could be discovered; the condition gave him no pain except after fæcal passages, which brought on symptoms of fissure in ano. An examination of the lungs, kidneys, bladder, prostate, and the other organs failed to reveal any evidence of constitutional disease. The rectum and sigmoid showed nothing pathological save a small ulcer in the posterior commissure about $\frac{3}{4}$ of an inch from the cutaneous margin. From this ulcer there extended downward and outward a fistulous tract to the extent of about $\frac{1}{2}$ an inch. The ulcer was crenated and irregular in shape, the edges undermined, and discharged a scant sero-purulent fluid in which no tubercle bacilli could be found. The fistulous tract and the base of the ulcer were indurated but not nodular.

He was admitted to the Polyclinic Hospital on October 5, 1900. On October 6th an operation was performed by first incising and then dissecting out the ulcer and fibrous tissue. As the inflammatory process did not appear tubercular, and was very shallow, it was concluded that

the patient would suffer less from spasm of the sphincters if the wound were left open to heal by granulation. He never had an unfavorable symptom while in the hospital, and on October 13th the wound looked so healthy and the patient felt so comfortable that he was allowed to go home, with instructions to present himself for observation occasionally. On October 16th he felt a sensation of chilliness and malaise, and later he was seized with a distinct rigor. From this time on he was never without some temperature; he rapidly failed in strength, and finally died from tubercular peritonitis on January 5th. The patient, according to his doctor and family, had never had a symptom of peritoneal trouble before this operation. Microscopic examination of the specimen removed revealed no tubercle bacilli, but there were some giant-cells surrounded by embryonic tissue which the author believes proved the tubercular nature of the ulcer.

A third case, W. D., aged twenty-seven, presented himself at the clinic on January 2, 1901, with the history of having suffered from a perirectal abscess some two months previously. This had failed to heal, and caused him considerable annoyance. Examination showed the existence of a horseshoe fistula opening externally upon one side and entering the rectum at the posterior commissure about $\frac{1}{2}$ an inch above the margin of the anus. The fistulous tract upon the opposite side was not open externally but discharged through the rectal opening. A careful examination was made of the patient's lungs, throat, kidneys, bladder, and prostate with negative results; he had no temperature, no cough, and no symptom of pulmonary disease at the time he was admitted to the hospital. The discharge from the abscess was examined by the microscope and no tubercle bacilli were found; the culture test was not made. An effort to reduce the discharges by irrigation was unsuccessful, and therefore it was advised that the tract be opened. This was done February 1, 1901, under the strictest antiseptic precautions. The parts were dressed with ichthyol and glycerin after having been washed out thoroughly with bichloride solution. Bacilli were found in a section of tissue removed at the time of operation.

No unusual symptom followed save a slight elevation of temperature during the first twenty-four hours. After this the patient felt perfectly well and began to improve in his looks, appetite, and general condition. In four weeks the wound granulated and was filling up, but the patient began to lose his appetite and feel exhausted, especially in the morning. On February 10th he had a marked hæmoptysis which nearly cost him his life, and from that time forward he rapidly developed tuberculosis of the right apex with all the concomitant symptoms. At the same time under antiseptic dressings and treatment the fistulous wound on one side practically healed, but on the other, after healing, it broke down and

had the typical appearance of a tubercular ulcer. He was taken from the hospital and it was reported later that he died within six months.

It may be said that these cases are accidental, and that the constitutional symptoms would have manifested themselves had no operation been done, but there is no proof of this. In the first case the patient had carried his fistula for two years without any pulmonary implication, and yet developed it within a short time after operation by the open method. In the second case the patient had suffered from his rectal ulceration or fistula for over six months without any constitutional implication, and yet he developed tubercular peritonitis within two weeks from the time of the open operation. In the third case the period during which the patient had suffered from fistula was no doubt brief, but at the same time it was considerably longer than that between the operation and the development of the pulmonary symptoms.

Quite a number of patients suffering from pulmonary tuberculosis have been seen who are very positive that they never had any cough or pulmonary affection until after operative interference with their fistulas, and it is well known that the above cases can be supported by many others reported in medical literature. The results, therefore, do not justify the risks of open incision.

Where the tubercular fistula can be entirely removed, and the wound closed by immediate suture, the probabilities of complete cure are very encouraging; but when the fistulous tract is so deep and tortuous, or so great in extent that immediate closure is impossible, operation by the heated knife is to be preferred. In the majority of instances the patient will be more benefited by providing necessary drainage and cauterizing the lining membrane of the fistulous tract than by laying it entirely open; but even with the cautery the surrounding cicatricial wall should not be broken down unless complete excision and immediate suture can be practised.

TREATMENT.—The treatment of fistula consists in the obliteration of the chronic, suppurating tracts, either by the process of granulation or by excision with immediate suture. The first method is that which is generally employed. The means of inducing this granulation may be described as the conservative and radical.

Conservative or Non-operative Methods.—By these terms we do not mean a method without any incision; every fistula is practically a chronic abscess, and it is hopeless to attempt to cure them without establishing complete drainage; an incision to accomplish this is therefore always necessary.

In simple, blind external fistulas, complete drainage with curettage or cauterization of the tract and dilatation of the sphincter will always result in a cure without further operative interference. Where it does

not, one may very reasonably conclude that there is some connection with the rectum through which reinfection is taking place, or a pathological condition of the fistula itself, which destroys healthy granulation. In a number of blind external fistulas cure may be effected by distending the cavity with a saturated solution of nitrate of silver (960 grains per fluid ounce), and after this has remained for two or three minutes the parts are cocainized, the opening is enlarged so as to give perfect drainage to the cavity, and the sphincter is stretched gently either with the fingers or with the rectal dilator.* Thorough dilatation of this muscle is better, but it can not ordinarily be accomplished without general anæsthesia. By the use of nitrous-oxide gas or ethyl chloride it is possible to perform this operation in the clinic upon walking cases, but in private practice one would scarcely dare give even these general anæsthetics and allow the patients to go home immediately afterward.

Bennett states that he has cured a large number of complete fistulas by the injection of concentrated solutions of nitrate of silver into them, and Goodsall and Miles advocate this method of treatment in all cases in which the inner opening is above the internal sphincter. The distention of the cavity by the solution of silver should always be followed by the enlargement of the external opening in order that the necrosed tissue and increasing discharge due to that cauterant may have a free outlet. Formerly it was a practice to inject these tracts with equal parts of iodine and carbolic acid, which gave some very satisfactory results. Pure tincture of iodine and tincture of rhatany, solutions of copper sulphate, the solid stick of nitrate of silver, and many other cauterizing agents have been employed from time immemorial in this method of treatment. On the whole, however, the saturated solution of nitrate of silver is the most satisfactory. It is better than the solid stick, because it reaches all the diverticuli and tortuous tracts, whereas the stick only applies itself to the accessible portions of the abscess cavity, and it is very likely to break off when it is introduced into a deep tract. In narrow, subtegumentary fistulas, both of the complete and blind external variety, cures may be effected by the introduction of a probe upon which nitrate of silver has been fused. The discharge and irritation are increased for a few days following this treatment, after which healthy granulation springs up and the tract becomes obliterated. After the injection or application of the nitrate of silver, the slough which it produces will all come away in about ten days, and ordinarily a healthy granulation will be established. If this is not the case, the application should be repeated. Where the granulation is established, however, the applica-

* Powell advocates the use of pure carbolic acid instead of nitrate of silver, and claims to have obtained excellent results from it (*Amer. Surg. and Gynecol.*, April, 1902).

tion should not be repeated for two or three weeks. It may be necessary to inject the solution three or four times at such intervals before a cure is accomplished.

When the fistula is of the complete variety, it is well to inject a little sweet-oil into the rectum before the nitrate of silver is introduced into the fistulous cavity, in order to prevent the drug from irritating the mucous membrane if it should pass through into the intestine. Good-sall and Miles, whose large experience gives weight to their opinion,



FIG. 126.—ALLINGHAM'S LIGATURE-CARRIER.

in speaking of this method of treatment for fistulas opening into the rectum above the internal sphincter, say: "When after repeated applications the sinus still remains unhealed, it is better to leave it alone than to incur the risk of probable incontinence by the division of the internal sphincter for the cure of the fistula. In fact the patient should be urged to tolerate the persistency of his fistula rather than take the risk of loss of the power of control over the contents of the rectum." This is undoubtedly a too conservative view; in cases in which radical excision with immediate suture is possible, there is no reason why the internal sphincter should not be just as successfully sutured as the external. The advisability of testing the methods of local treatment before resorting to an operation which involves the cutting of the sphincters can not be contested; they not only succeed in many cases, but they possess the advantage of finally decreasing the amount of discharge and reducing the size of the fistulous tract to such an extent that, if they fail to cure, the parts are in a much better condition afterward for radical operation. In the treatment of complete fistulas by this method, it is important that the stools be kept well formed, because if thin and watery they will escape through the internal opening and prevent healing.

It is the practice of certain itinerant specialists to wash out the abscess cavity with peroxide of hydrogen until the effervescence caused by it has ceased. After this they irrigate the fistulous cavity with a solution of bichloride of mercury, carbolic acid, or nitrate of silver, and repeat this treatment every second or third day. When the discharge has been largely controlled, they dilate the mouth of the fistula with forceps or lay it open under the anæsthetic action of cocaine, and thus obtain free drainage. The method is rational, and there is no doubt that they succeed in curing a great many cases by this method.

Where these conservative methods fail to effect a cure after six or eight weeks' trial one should then attempt radical operation. Before

doing this, however, in fact before attempting any treatment whatever, one should satisfy himself absolutely with regard to the pathological nature of the fistula, and if tuberculosis, syphilis, or malignant disease exists, he should be guided by the principles laid down in the preceding section of this chapter.

The Ligature.—The treatment of fistulas by the use of the ligature is classed by many among the conservative or non-operative methods. The only ground for this is in the fact that the cutting is done without a knife and there is no hæmorrhage. It accomplishes exactly the same division of tissues as is done by incision, only in a much slower and more painful manner. It has been employed since the time of Hippocrates. Silk, linen, and elastic threads have all been used, but at present only the rubber ligature is employed; this was first utilized for this purpose by Lee and Holthouse; Dittel, of Vienna, afterward employed it, and Allingham and Bodenhamer adopted the method after him.

The principle upon which the method rests consists in the cutting through of the overlying tissues by the continuous contraction of the elastic thread. It was at one time supposed that healthy granulation was established in the fistulous tract and followed the ligature out as it cut its way through by slow attrition, thus obliterating the tract at the same time. This claim has been abandoned, however, and all who employ this method now use the small, round, solid-rubber ligature. It is passed through the fistulous tract either with forceps or by a specially devised instrument (Fig. 126) known as the ligature-carrier. Where the fistulous

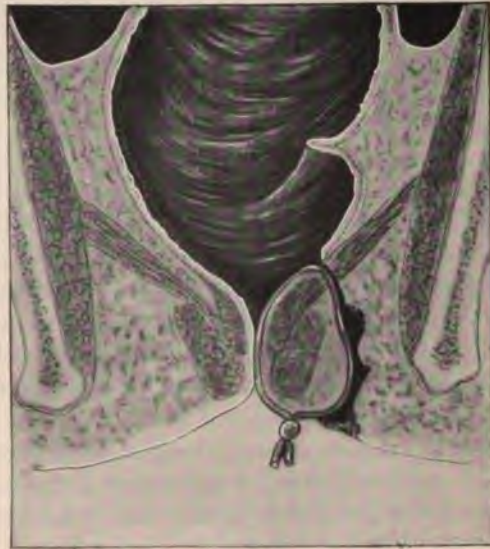


FIG. 127.—LIGATURE PASSED THROUGH FISTULA AND SECURED.

tract passes beneath the skin an incision should be made through this tissue, for where this is not done the pain is almost unbearable.

Having passed the ligature through the fistula, a small metal shield or perforated shot is passed over the two ends and fastened by pressure with a strong forceps while the rubber is fully extended (Fig. 127). The

advantages claimed for this method are that it occasions little pain, does not confine the patient, is free from the dangers of hæmorrhage, and a certain number will submit to it who absolutely refuse to have any cutting operation done. Allingham says: "Those who find any difficulty in getting the ligature to cut quickly and painlessly are ignorant of the proper method of applying it"; but unfortunately he does not give any description of this proper method. In the author's experience it has proved successful in curing the few cases in which it has been applied; but, so far as the patient's going about with it or suffering no pain is concerned, the claims of its advocates can not be substantiated. The experience of every patient that has been treated by this method is that they have suffered greatly and often been confined to their beds while the ligature was cutting through; in two cases it has been necessary to remove it on account of the pain. The only real advantage which the method seems to possess over that of incision consists in the absence of hæmorrhage. With the numerous instruments at one's command by which bleeding can be controlled, this recommendation carries little weight except in cases where the internal opening is very high in the rectum. One never sees at the present day uncontrollable hæmorrhage in operations for this condition; but, for the sake of argument, admitting that the ligature does obviate this possible danger, this advantage is more than counterbalanced by the objections to it.

In its employment no antiseptic precautions are taken, and there is no guard against infection of the freshly cut tissues from the bacteria always present; it is followed by a dense, hard cicatrix; it only accomplishes after days what can be done with a knife or thermo-cautery in a few moments; and finally, after the fistulous tract has been cut through by this method, it will often be necessary to lay open and enlarge lateral tracts with the knife or scissors. On the whole, therefore, if the tissues intervening between the rectum and the fistulous tract are to be cut through at all, it seems preferable that it should be done as rapidly as possible under antiseptic precautions and circumstances which will allow the whole suppurative tract to be laid open and treated at one time without having the operation divided into two or three sittings.

If the application is technically carried out and the ligature always passed through the internal pathological opening, there is no doubt that it will result in a cure in the large majority of cases. *The finding and laying open of the pathological tract leading into the rectum is the secret of success in the treatment of fistula, whether it is done by the ligature, knife, écraseur, or cautery.* It is difficult, sometimes impossible, to trace long, tortuous tracts with the ligature carrier, and puncturing the rectal wall

at the highest point of the cavity so as to make a way for the thread is sure to result in failure here, just as it does in operation by incision, because a part of the fistula is left untouched (Fig. 128).

It has been claimed that faecal incontinence is much less likely to occur from this method than from operation by incision. Incontinence depends upon the amount of muscular tissue cut and the imperfect apposition of the fibers when they reunite. If the muscle is cut squarely across by a sharp knife it will be less likely to occur than if it is done by the crushing process of a ligature, for the width of the cicatrix will be less. There is neither fact nor reasonable theory to substantiate this claim for the ligature.

The writer is well aware of the fact that a number of fistulas have been cured by the ligature which had been unsuccessfully operated upon by incision. The explanation

of these cases lies simply in the fact that the operators found the pathological opening and cut it through with the ligature. Had the original operators found this orifice and cut it through with the knife, the operations would have been equally successful. It is simply a question here to find and remove the source of infection by laying open and draining the entire pathological tract.

In those cases where the internal opening is 3 to 4 inches above the sphincter muscle, the elastic ligature is a safe and reliable method of laying open the tract. The advisability of opening such a tract at all, however, is by no means settled. As quoted above, Goodsall and Miles absolutely oppose such an operation; Quénu and Hartmann believe that incision is a dangerous procedure under such circumstances; they hold that complete excision with immediate suture is preferable, and the author agrees with them.

Fistulotomy.—One other conservative method of treating fistulas should be mentioned. It consists practically in scarifying or incising



FIG. 128.—FISTULA IN WHICH THE INTERNAL OPENING (A) IS IN A DIFFERENT QUADRANT FROM THAT IN WHICH THE ABSCESS CAVITY (B) IS NEAREST THE RECTAL WALL, AND SHOWING HOW PERFORATING THE WALL AT THE LATTER POINT AND INCISING THE GUT DOWN TO THE ANUS BY LIGATURE OR KNIFE WILL LEAVE A PART OF THE PATHOLOGICAL TRACT UNTOUCHED.

the walls of the fistulous tract. It may be done with a blunt-pointed tenotome or the fistulotome of Mathews (Fig. 129). Fistulotomy is applicable only to comparatively straight and narrow fistulas. It is based on the same principle as internal urethrotomy, i. e., an instrument carrying a concealed knife is introduced to the deepest portion; the knife is then thrust out and with a quick motion it is withdrawn, thereby incising



FIG. 129.—MATHEWS'S FISTULOTOME.

the walls of the fistula. This being done frequently scarifies the tract in all its circumference. The operation may have to be repeated several times before a cure is obtained.

The claims made for this procedure, that it dissipates fear, avoids hæmorrhage, does not involve the sphincter, and requires no detention from business, are chimerical and likely to mislead the inexperienced. Blind incision into vascular areas can not possibly be free from the danger of hæmorrhage, and being made through infected tissues it is also likely to induce sepsis. No adequate drainage is established by it, and it may be followed by burrowing or collateral abscesses. Its field is very limited, it requires a special instrument, and, finally, its results are not comparable to treatment by nitrate of silver, because it does not improve the condition of the parts for radical operation if this should become necessary.

Operative Treatment of Fistula.—Of the operative methods, the three which deserve consideration are *incision*, *excision*, and *excision with immediate suture*.

Each of these should be undertaken with the most perfect surgical technique. The patient should be as carefully prepared and the rules of *antisepsis* as perfectly followed as in any major operation. Antiseptic methods are employed here because the field is already infected and *asepsis* is impossible.

The Preparation of the Patient.—The best results will be obtained in those cases in which the fistula has been treated by peroxide of hydrogen and nitrate of silver until the purulent discharge has practically ceased and the cavity contracted as much as possible. When the time and circumstances of the patient permit, this should always be carried out. The actual preparation of the patient for operation is practically the same in all the different methods. The bowels should be thoroughly cleaned out and the patient put on a limited nitrogenous diet thirty-six hours before the operation. Purgation should have ceased entirely before the operation is undertaken.

Along with the preparatory treatment one may institute an attempt at intestinal antiseptis by the administration of beta-naphthol, salol, boric acid, or sulpho-carbolate of zinc. While it is impossible to obtain absolute asepsis of the intestinal tract, there is no doubt that cases treated by this preliminary preparation have less intestinal disturbance and sepsis than those operated upon without it. On the evening before operating a large soapsuds enema should be administered, and when this has been passed the perianal region should be carefully shaved, scrubbed with green soap, and dressed with absorbent gauze moistened in a solution of bichloride of mercury (1 to 2,000). This dressing should be kept moist and retained *in situ* until the operation begins. Two hours before the operation itself an enema of about 1 pint of 25-per-cent peroxide of hydrogen solution should be given.

The anæsthetic employed will depend upon the condition of the patient and the extent of the fistula. Where it is proposed simply to incise it, the parts may be anæsthetized by the hypodermic injection of cocaine; in the majority of subtegumentary fistulas this is all that will be necessary. In cases where there are extensive fistulas that require large dissection and dilatation of the sphincters, general anæsthesia is much more satisfactory. Where it is not contraindicated by cardiac conditions, chloroform is preferable to ether in operations upon the rectum on account of the slight amount of nausea and retching which follow it. Ethyl chloride or kelene is an excellent anæsthetic for short operations, and as an adjuvant to the administration of ether it is very useful, but it is not satisfactory in extensive operations on account of the fact that it does not relax the muscles sufficiently.

A very satisfactory method is spinal cocaineization, because there is less oozing from the vessels, and after the first few minutes when nausea exists the patient is more quiet, the sphincter muscles more relaxed, and there is absolutely no pain; furthermore, in this method of anæsthesia the rectum sometimes becomes insensitive before the feet and legs. No vomiting or straining to dislodge the dressing follows it, and the analgesic effect continues for several hours afterward, thus contributing to the comfort of the patient. There is generally some headache on the following day, but this is not very severe. The remote effects of this method have not yet been determined, and consequently it is not recommended unconditionally.

After the patient has been anæsthetized the sphincters should be thoroughly stretched. By this means whatever fluid or fæcal material is retained in the rectum can be removed and the organ cleansed. At the same time any ulceration or internal fistulous opening can be seen, and the operation will thus be simplified. It is important that the

stretching should be done before scrubbing the outside tissues, because if the latter is done first, when the rectum is stretched open the rectal contents will immediately flow out over the external parts which have been scrubbed, and the cleansing will have been in vain. After the sphincters have been dilated, the rectum irrigated with a 1-to-2,000 bichloride solution, and scrubbed with cotton swabs, a good-sized sponge, threaded on a strong silk ligature, should be introduced to prevent the escape of any intestinal contents over the operative field.

Having thus protected the lower portion of the rectum, the external surface, the buttocks, the perinaeum, and the scrotum should all be thoroughly scrubbed with soap, bichloride of mercury, and alcohol. The fistulous tract itself should be injected with peroxide of hydrogen or a solution of 1-to-500 bichloride of mercury, and thoroughly washed out in order to free it as far as possible from the pyogenic germs.

Position.—The position of the patient for operations on fistulas depends largely upon the habit of the operator. Some prefer the lateral

prone position, others the lithotomy position, and still others prefer to have the patient laid upon his chest and propped up in the knee-chest posture. Practice should vary according to the location of the fistula; if there is an internal opening in the anterior quadrant of the rectum, it is best to have the patient in the extreme prone position with the thighs drawn well



FIG. 130.—CLOVER'S CRUTCH.

up to the abdomen; if it is upon the side or posterior quadrant the lithotomy position is preferable. The legs will be held in position by two assistants, or better still by the Clover crutch (Fig. 130), or Kelly's straps. The upright posts upon the ordinary gynæcological table serve fairly well, but they do not allow of as much separation of the thighs as the apparatus mentioned, and the patient is likely to slip back from the edge of the table when these are used. In the majority of instances one may say that the lithotomy position is the more satisfactory.

Instruments.—The instruments necessary for an operation upon fistula are the following:

Probes.—These should be of various sizes, flexible, from 4 to 8 inches in length, and have flat handles in order to determine the direction of the points when bent.

Grooved Directors.—There have been a number of special directors devised for operations upon fistulas. Some are made with probe points, as that of Brodie (Fig. 131). Some are made of stiff steel, and others of flexible material.

Allingham has devised one, into the groove of which a sort of button attached to the lower blade of a pair of strong scissors fits, and thus guides it as the tissues are cut through. These instruments are ingenious, but an ordinary steel or German silver grooved director serves every purpose.



FIG. 131.—BRODIE'S PROBE-POINTED GROOVED DIRECTOR.

Knives.—The operator should be provided with two

curved bistouries, one sharp and the other blunt-pointed, a good scalpel, preferably of small size, and one with a long, narrow blade.

Scissors.—These should be straight, angular, and curved on the flat. The Emmet cervical scissors is sometimes very useful, but not indispensable.

Artery Forceps.—These should have very wide jaws and small points (Fig. 132) in order that the ligatures will slip over them easily, as it is frequently difficult to tie vessels in the rectal cavity over narrow-nosed forceps. T-shaped hæmostatic forceps (Fig. 133) are also very useful. One should also have two or more long-blade pressure forceps in case it is necessary to grasp the lips of the wound *en masse*.



FIG. 132.—ARTERY FORCEPS.

Tissue Forceps.—These should be of several varieties. Plain dissecting, mouse-tooth, and tissue forceps with wide bite are all necessary at times. Some of these should be furnished with a fixation clamp in order that the operator may loosen his grip at times.



FIG. 133.—T-SHAPED HÆMOSTATIC FORCEPS.

Needles.—These should be round, without cutting edges, and of various curves and sizes. Those describing a semicircle (Fig. 134) are almost indispensable in suturing deep fistulas.

The Needle-holder.—Without assuming to make comparisons, in a general way the Wyeth needle-holder (Fig. 135) is by all means the most

satisfactory in rectal work. It may be used with all kinds of needles, and has one great advantage, that however small or fine the needle grasped may be it is not broken.

Suture and Ligature Material.—Catgut, both plain and chromicized, silkworm gut, silk thread, kangaroo tendon, and silver wire are all used at times for fistula, and should always be in one's operating bag.

Specula and Retractors.—The Van Buren or Sims's duckbill specula are the only ones which are of any particular use in operations for fistula. Rectal retractors are also quite useful in connection with these instruments.



FIG. 134.—NEEDLES FOR RECTAL SURGERY (ACTUAL SIZE).

Sharp retractors are of great assistance to hold the tissues apart when one attempts to dissect out the fistula or to remove the cicatricial tissues at its base.

Tenacula.—One should always have two uterine tenacula in operating for fistula, as they are frequently of great assistance in accurately approximating the edges of the wound when immediate suture is attempted.

Cautery.—One should never attempt any operation on the rectum without a Paquelin or electro-cautery at hand. The former is much more satisfactory, and they are now made so compact that they occupy little space in the operating-bag.

After all these preparations the surgeon may proceed with the actual operation, choosing that method which is best adapted to the individual case.

INCISION.—The operation of incision for ano-rectal fistula, while the simplest is by no means the oldest of the procedures in this disease. Excision, crushing, and the ligature were used many centuries before Pott first advised this simple method. It is based upon the one idea of overcoming spasm of the sphincter, which by keeping up a persistent motion in the parts, acting as a stricture of the rectum, obstructing the free discharge of gas and fæcal matters through the anus, and thus forcing them out through the fistula, was supposed to prevent its healing.



FIG. 135.—WYETH'S NEEDLE-HOLDER.

The operation in complete fistula consists in the thorough division of the sæptum between the rectum and the fistulous tract. This division may be carried out by the knife, scissors, thermo-cautery, or the écraseur. In the incomplete type it consists in laying open the fistulous tracts

through the skin or mucous membrane in order to obtain complete drainage and afford opportunity for the proper cleansing and dressing of the parts. Salmon added to this incisions into the perifistulous, fibrous tissue, holding that they hasten the development of healthy granulation. Pott in his original brochure upon this subject advocated the turning of incomplete fistula into the complete variety in order to overcome the mobility occasioned by the spasm of the muscle. The same advantages in blind external fistula may be obtained by stretching the sphincter without the exposure of the fistulous tract to the infectious bacteria in the intestine, and with little danger of chronic ulceration of the rectum and incontinence of feces. Wherever a fistulous tract of this type fails to heal after this treatment, one may set it down as a fact that the patient is either syphilitic, tuberculous, or, what is very much more likely to be the case, there is a communication between it and the rec-

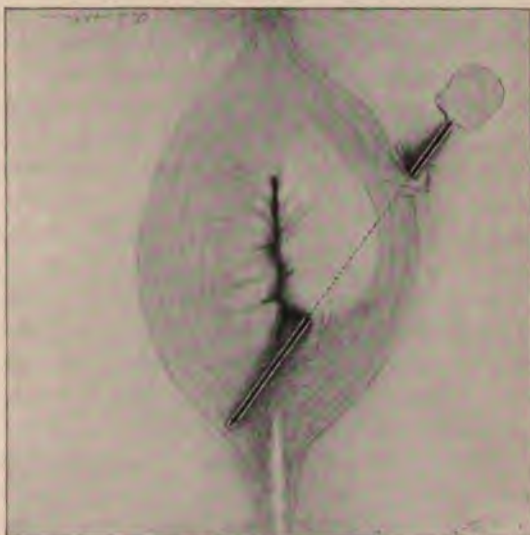


FIG. 136.—GROOVED DIRECTOR PASSED THROUGH FISTULOUS TRACT AND SHOWING HOW PASSING A BISTOURY ALONG THE GROOVE AND CUTTING OUTWARD WILL DIVIDE THE SPHINCTER OBLIQUELY.

tum which the operator has failed to discover. It may be said that it is never necessary to make a surgical opening in the rectum for the cure of a fistula where no pathological opening exists.

The steps in the operation are as follows:

Blind external fistula should be laid open by a circular incision through the skin parallel with but outside or inside of the external sphincter; this incision should be wide enough to drain the cavity perfectly and leave no pockets. In the complete type the tract should be opened little by little outside of the sphincter until a point immediately below the internal opening is reached; then with a grooved director passed through this and out of the anus, the overlying tissues should be cut in a perpendicular direction, thus severing the fibers of the sphincter squarely across (Figs. 136, 137). If there are any connective-tissue bands dividing the cavity into compartments, these should be broken down or

them to heal. After the tracts have been laid open the sphincters should be thoroughly dilated and the treatment for simple rectal ulceration begun. In these cases rest in bed is imperative, the diet should

be carefully regulated, and the stools kept regular and semisolid.

No force should ever be used in the introduction of a probe or grooved director into a fistulous tract. The cellular tissues about the parts are so soft that they may be easily penetrated, and one may even incise both the external and internal openings and yet leave a part of the fistula intact (Fig. 144).

After the fistulous tract has been laid open, it often happens that the burrowing around the rectum extends considerably above the level of the internal opening. Many operators

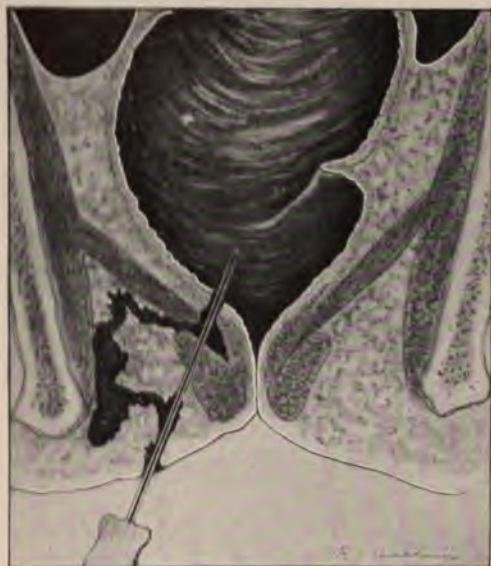


FIG. 144.—DIRECTOR PASSING THROUGH INTERNAL AND EXTERNAL OPENINGS OF FISTULA AND LEAVING PART OF TRACT UNTOUCHED.

claim that it is wise to incise the rectal wall up to the highest point of such cavities. This, however, is rarely necessary. If the parts are thoroughly drained and the sphincters put at rest by stretching and incision, these cavities will rapidly fill up by healthy granulation, and the cutting of the internal sphincter will be avoided. If, however, there should be a burrowing tract involving only the mucous membrane of the rectum, it is safer to lay this open. In order to avoid hæmorrhage, the heated knife should be used for this purpose. All burrowing tracts and diverticuli should be freely laid open into the main wound. Where the fistula is connected by burrowing tracts with the retro-rectal or pelvi-rectal spaces, these cavities should be opened into the general wound and drained by the introduction of rubber tubes.

The dressing of the wounds after all these operations for fistula is the same as that already described; they should never be packed tightly, inasmuch as this holds the tissues apart and results in delayed union with extensive cicatrices.

Complex Fistula.—Quite a large percentage of fistulas are of the complex variety. Any perirectal abscess or fistula, if improperly drained,

may resolve itself into this variety through burrowing and destruction of tissue.

They are described as *fistulas with lateral burrowing tracts, watering-pot fistulas, and horseshoe fistulas*.

Fistula with Lateral Burrowing Tracts.—Any simple fistula resulting from an abscess left to open spontaneously, or occurring in individuals with vitiated constitutional conditions, is likely to become complex by burrowing tracts leading off from the abscess cavity. Goodsall pointed out many years ago the rules of extension of fistulous tracts. Those in the anterior quadrant proceed directly into the anus or rectum, the aperture being found almost perpendicularly above the external opening. Those in the posterior quadrants extend circularly around the anus, and generally open at some point near the posterior commissure.

Subtegumentary fistulas at any point on the anal circumference may burrow subcutaneously in all directions, because there are no connective-tissue walls to obstruct them. Those situated anteriorly are likely to extend forward into the perinæum and scrotum or upward into the cruro-scrotal fold. Those situated posteriorly burrow outward into the buttocks, or upward behind the coccyx and sacrum beneath the skin. The extent to which these subcutaneous burrowings may take place is very remarkable. In one case a small anterior fistula burrowed forward through the perinæum and crural folds and upward into the iliac region, opening upon the skin at a point near the anterior superior spine of the ilium. In another case (Fig. 147) a superficial fistula burrowed upward outside of the sacrum and coccyx, turned anteriorly above the level of the fourth sacral vertebra, passed underneath the gluteal muscles, and opened at a point just below the greater trochanter.

An apparently simple, direct, subtegumentary fistula may have a tract burrowing upward into the ischio-rectal fossa (Fig. 145) or even entering the superior pelvi-rectal space. Submuscular fistulas passing



FIG. 145.—FISTULOUS TRACT PASSING THROUGH EXTERNAL SPHINCTER.

While Smith's method of excision and introduction of sutures is practically the same as that laid down by Chassaignac, it is entirely due to him that impetus has been given to the present method of operation, and the recognized technique of its performance has been prescribed.

The preparation of the patient by purges, enemas, shaving, etc., must be carefully carried out. It is important also that the fistulous tract

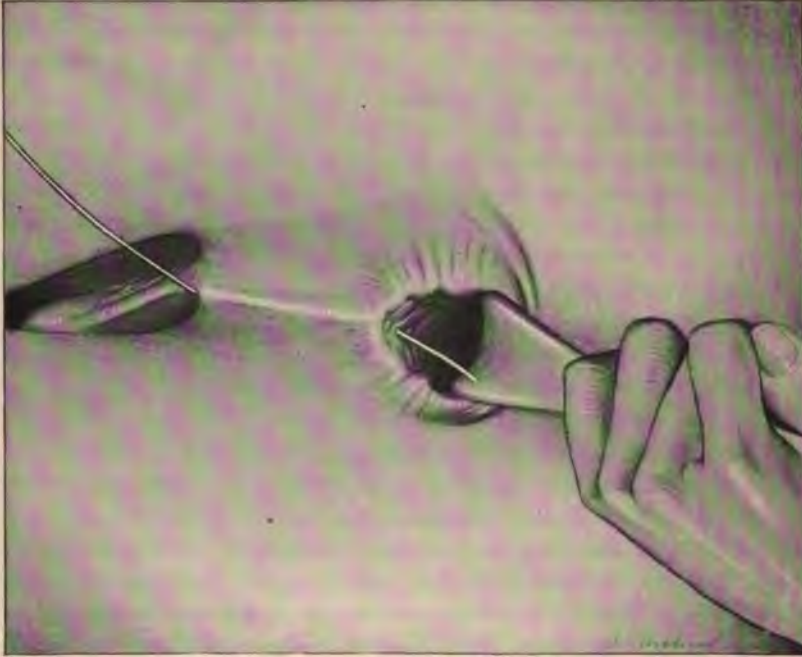


FIG. 138.—FIRST STEP IN EXCISION OF FISTULA.

should be treated with peroxide of hydrogen and antiseptic solutions for several days before the contemplated operation. After the patient is anæsthetized he should be placed in whatever position affords the operator the easiest access to the parts.

The sphincters should be stretched and the parts cleaned according to the directions already given. The succeeding steps of the operation will depend upon whether the fistulous tract is a simple, straight canal or a tortuous, irregular, abscess cavity.

In the first instance the probe or grooved director should be introduced through the fistulous tract; preferably a pure silver probe long enough to be bent and held as a sort of traction loop (Fig. 138). The skin and mucous membrane covering the fistulous tract should then be incised in a straight line from the external to the internal opening and dissected back a little to each side; the deeper tissue should then be

incised until one comes upon the cicatricial or indurated wall of the fistulous tract; if this tract passes outside of the external sphincter or through its fibers, it will be perfectly feasible to cut these fibers transversely and draw them to one side so that none of their substance will be removed.

Having thus cut down upon the fistulous tract, but not into it, the incision is carried around the external opening, and the entire indurated mass dissected upward and inward until it is completely removed by a circular incision around the internal opening (Fig. 139). In this manner the fistula is excised *in toto*, and remains threaded upon the probe. One must be familiar with the appearance of the diseased tissues in such cases, and be very careful to go entirely outside of them in the dissection. When during such an operation the diseased tissue is in-

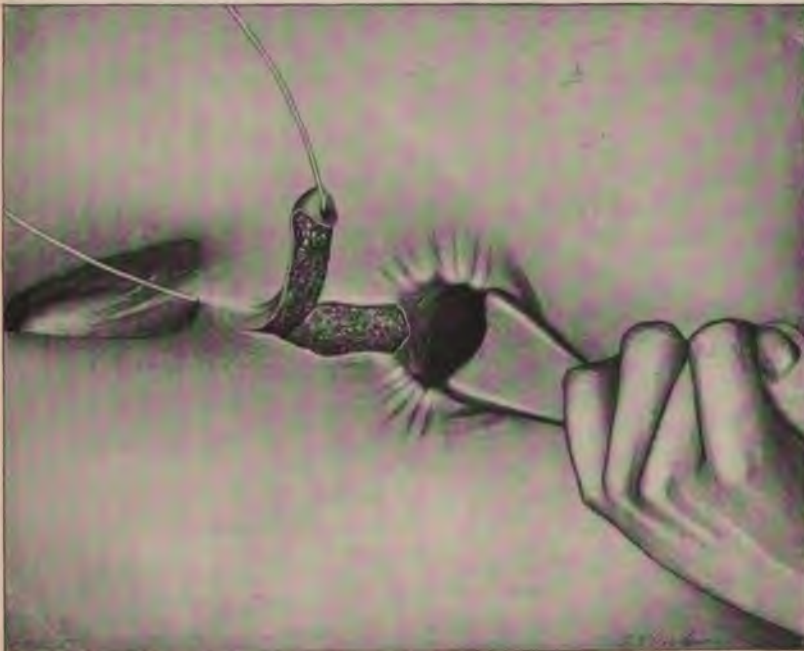


FIG. 139.—REMOVAL OF A FISTULA THREADED UPON A PROBE.

(In the case from which this illustration was drawn the dissection was made from within outward, but ordinarily this course should be reversed.)

vaded by the scissors or knife, the instrument should be changed for another lest by any possibility the healthy tissues should be infected.

Having removed the tract, the application of the sutures is the next step. Considerable ingenuity will need to be exercised in every case to bring the parts accurately together. The first step consists in intro-

ducing two or three silkworm-gut sutures from one side of the wound to the other and entirely below it; these are intended to prevent traction on the deeper sutures, and their ends are left loose until the latter are all in place. After this the deeper portions of the wound are brought together by a continuous suture of medium-sized catgut. Plain sterilized gut is better for this purpose than the chromicized. As the tissues through which these sutures pass are frequently of a fragile, cellular nature, the mattress-stitch will be found most satisfactory (Fig. 140). Layer by layer the parts are brought together until the wound is closed to the level of the skin or mucous membrane. The divided ends of the sphincter are brought together by interrupted sutures. The deep suture is not used to bring the skin and mucous membrane together. The reason for this is that it is almost impossible to sterilize the skin, and hence if the same suture which is used in the deeper tissues be passed through it, infection is liable to follow its tract downward into the



FIG. 140.—METHOD OF INTRODUCING THE SUTURES AFTER EXCISION OF FISTULA.

deeper portions of the wound. Subcutaneous suturing of the edges of the wound has resulted unsatisfactorily. The very slightest puncture which will hold the edges in apposition should be made in order that the needle and thread may not penetrate into the cellular tissues and thus possibly infect them. By these means the entire tract is accurately

brought together and closed (Fig. 141). After this has been accomplished, the deep anchoring or reenforcing sutures first introduced are tied together, thus supporting the deeper ones and bringing the parts into closer apposition. All bleeding and oozing should be thoroughly checked before the suturing begins. After the wound has been accu-

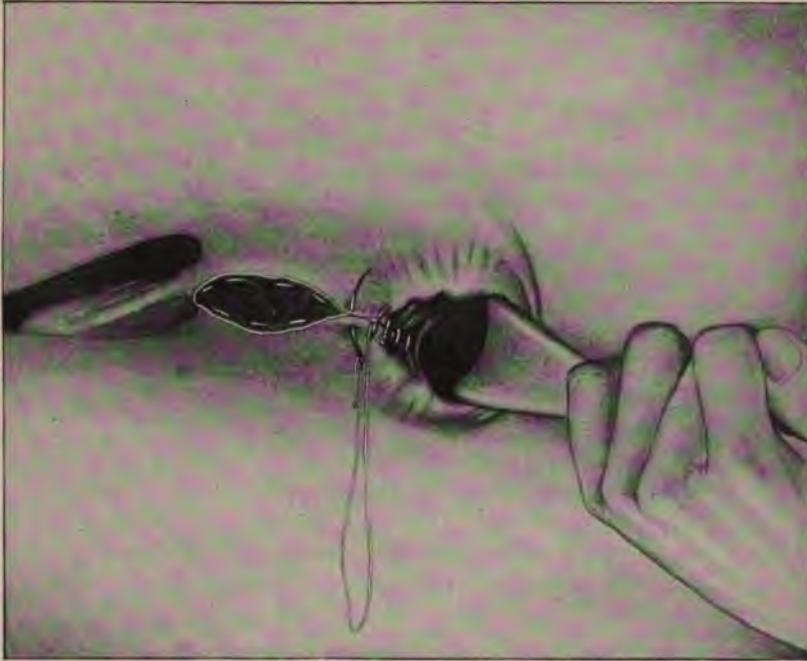


FIG. 141.—FINAL STEP IN CLOSING FISTULA.

ately closed, it should be sealed with iodoformized collodion and thus be protected from the faecal discharges which may escape after the operation.

Another method is to suture the edges of the skin wound up to the margin of the anus; the slit in the mucous membrane is then rounded off, and that above its upper angle is loosened up from the tissues, just as in the Whitehead operation for hæmorrhoids, and is then dragged down and sutured to the surface skin a slight distance beyond the margin of the anus. The idea of this consists in producing an absolutely impervious layer covering that portion of the wound inside the anus or rectum, so that there will be no possibility of faecal percolation into the wound. Whatever discharges occur will pass over this valve-like flap of mucous membrane in which there is no solution of continuity, and will thus be discharged outside without coming into contact with the edges of the wound. The external skin surface being then protected

by collodion and proper dressing will run little risk of becoming infected (Fig. 142).

After the operation has been thus completed, antiseptic gauze is laid over the wound and held in position with a flat retractor, so that it will be impossible for the sponge in the rectum, which should be withdrawn, to come in contact with the edges of the wound during withdrawal. After this, with the retractor held in position and a Sims's vaginal speculum upon the opposite side of the rectum, a medium-sized drainage-tube, wrapped with a small quantity of gauze and covered with rubber protective, is introduced about 3 inches into the rectum

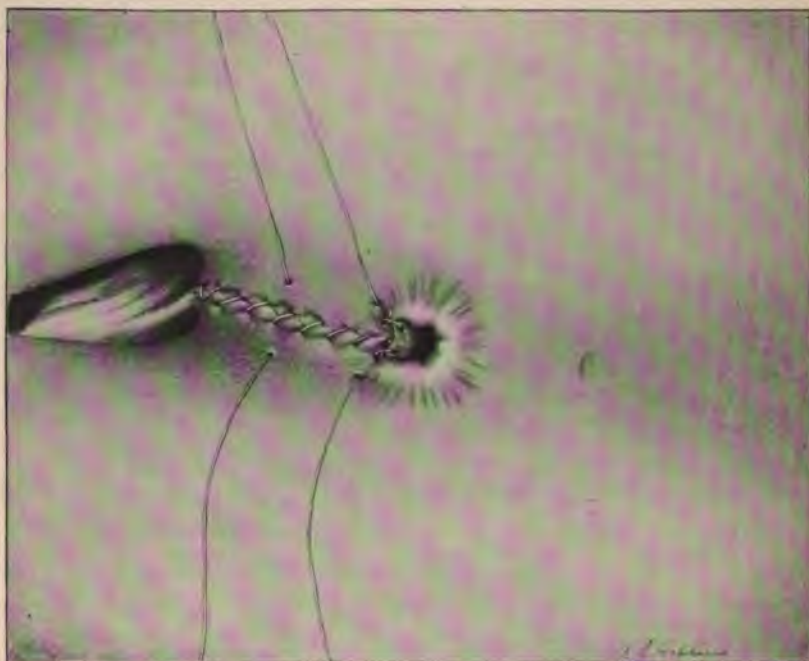


FIG. 142.—RECTAL PORTION OF FISTULA CLOSED BY FLAP OF MUCOUS MEMBRANE.

and allowed to remain for several days in order to facilitate the escape of gas and any fluid feces which may come down from the intestine above.

The after-treatment consists in confining the patient absolutely to bed, controlling the bowels by a certain quantity of opiates for six or seven days, and limiting him to liquid albumenoid diet. A milk diet is not satisfactory in such cases owing to the hard, caseous, insoluble stools produced by it. At the end of six or seven days the patient's bowels are moved by the injection of 5 ounces of warm water and 1 ounce of glycerin, in which is dissolved 2 ounces of inspissated ox-gall.

This proceeding may have to be repeated several times before an efficient evacuation is obtained, but it is not advisable to attempt the use of any laxative or purgative until the lower bowels have been relieved of any accumulation of hardened fecal masses such as are likely to follow the administration of opium and prolonged constipation. After these masses have been dissolved by the ox-gall and glycerin, one may then administer some mild laxative, and induce regular daily movements.

Rest in bed is incumbent upon these patients for at least two weeks in order to secure firm and perfect healing of the parts, at which time, if primary union shall have taken place, the fistula will be cured. The little mucous flap does not unite to the skin surface to which it is sewed, but does unite to the raw surface down to the margin of the skin. After the stitches are removed that portion of it which extends beyond the margin of the skin will retract and entirely disappear.

In tortuous fistulas with large abscess cavities and burrowing tracts the operation is more difficult. In such cases the fistula should first be flooded with 95-per-cent carbolic acid and then with a solution of methylene blue in alcohol. The alcohol neutralizes the acid and the methylene blue stains the fistulous tract and sinuses so that they can be easily followed in the dissection. The skin overlying the fistulous tract should then be incised; the sphincter muscle cut squarely across and its ends pulled aside, so that they can be accurately reunited; then the fistula with all its diverticula and surrounding cicatricial tissue should be carefully dissected out; and finally all bleeding vessels and oozing should be controlled before beginning to close the wound. Having accomplished this, the deep sutures should be introduced as described on page 394. It may sometimes be advisable to pass one of these sutures around the wound in a horizontal direction after the manner of a purse-string. The deeper parts of the wound are then brought together layer by layer with continuous or interrupted sutures, according to which produces the most accurate apposition. As Smith states, there is scarcely any fistula which can not be completely and thoroughly closed by this method of suturing. The superficial layers, the ends of the sphincter muscle, and the skin are brought together in the manner already described. As yet the author has not had the opportunity to use the mucous flap in any extensive operation for excision and suture of ano-rectal fistula, but there is no reason why it should not be applicable to all types, and a means of great protection against infection by discharges from the intestinal canal.

After the closure of the wound, the deep purse-string or reenforcing suture should be tied as previously described, the sponge withdrawn, and the parts dressed in the same manner as in the simple variety.

It is wise in cases of large dissection and suture to strap the folds

of the buttocks together with wide adhesive straps, and to bind the knees together with a bandage or towel in order that the movements of the patient in bed may not cause traction upon the wound and thus break loose the sutures.

By this method the absolute removal of the diseased tissues is accomplished, the accurate apposition of the parts insures better functional results, and finally a great deal of time and exhaustion, which necessarily follows the long processes of healing by granulation and suppuration, are saved.

The argument used against it is that primary union may fail, and does fail in a number of cases. This is not a valid objection, for the simple reason that where the union does fail, absolutely nothing is lost; one has accomplished everything that is intended by the open operation, and the patient proceeds to recovery by the same process of granulation which would have been necessary if no suturing had been done. If the operator is careful in his after attention there is absolutely no danger of fresh abscess and burrowing taking place. The symptoms of such conditions are perfectly clear, and if one should form it can be opened externally and drained, and the parts still heal in less time than they would by the method of incision.

This method is inapplicable to those cases in which the fistula is complicated by long, tortuous tracts that extend up into the superior pelvi-rectal or retro-rectal spaces, but in any case in which the depth of the fistula does not exceed $2\frac{1}{2}$ inches excision and suturing may be accurately carried out by a skilful operator.

In the application of these principles to the different varieties of fistula, the chief difficulty is to distinguish between the anatomical and pathological types of the disease. Where the diagnosis is accurate, one can not make any mistake in the selection of the method to be employed. The large majority of failures which follow operations for fistula are due to one of two facts: either a specific fistula is mistaken for a simple one, or the pathological opening into the rectum is not found, and thus a part of the tract remains. If these errors are avoided, every operation for non-specific fistula ought to prove successful.

In blind internal fistula the technique varies slightly.

In simple subtegumentary cases in which the opening can be found and a probe bent upon itself introduced into it, a small counter puncture may be made upon the lower end of the probe and the intervening tissues can then be incised by scissors or the cautery, or it can be excised and sutured. If the fistula has burrowed outside of the muscles into the ischio-rectal fossa and beneath the skin, incision through this tegument will convert it into the complete variety, and it should then be treated as such. Where such a conversion can be made without the use

of general anæsthesia it is always well to do this, and try drainage and stimulating applications for a week or two before resorting to radical operation. This conservatism is especially important where the opening is above the internal sphincter and its tract passes outside of this muscle.

Sometimes the fistulous tract does not run downward, but runs upward underneath the mucous membrane of the rectum. In such cases the upper portion of the tract may extend beyond the reach of the finger, and the incision may possibly be followed by severe hæmorrhage. In such cases one blade of a long, narrow pressure forceps may be introduced into the tract while the other passes into the cavity of the rectum; they are closed and allowed to remain until the tissues are cut through. If the entire tract is not laid open at the first attempt, the forceps may be introduced a little higher at a second sitting.

Where the tract leads downward in a tortuous direction, and the probe can not be passed from within, it is sometimes possible by bimanual palpation to discover the induration in the perineal region, and to cut down upon it from the outside and thus convert it into a complete fistula.



FIG. 143.—Y-SHAPED BLIND INTERNAL FISTULA.

Sometimes these fistulas bifurcate and form Y-shaped tracts (Fig. 143). When this is the case, laying open one of the branches will not be followed by healing, but suppuration will continue. In operating one should be very careful to search each side of the wound for any such diverging tracts, and if found lay them open at once.

The methods of treating these blind internal fistulas by injections of stimulating fluids without laying them open are utterly unreliable. The cavities are constantly reinfected by the intestinal contents, and without complete drainage and antiseptic treatment one can not expect

them to heal. After the tracts have been laid open the sphincters should be thoroughly dilated and the treatment for simple rectal ulceration begun. In these cases rest in bed is imperative, the diet should

be carefully regulated, and the stools kept regular and semisolid.

No force should ever be used in the introduction of a probe or grooved director into a fistulous tract. The cellular tissues about the parts are so soft that they may be easily penetrated, and one may even incise both the external and internal openings and yet leave a part of the fistula intact (Fig. 144).

After the fistulous tract has been laid open, it often happens that the burrowing around the rectum extends considerably above the level of the internal opening. Many operators

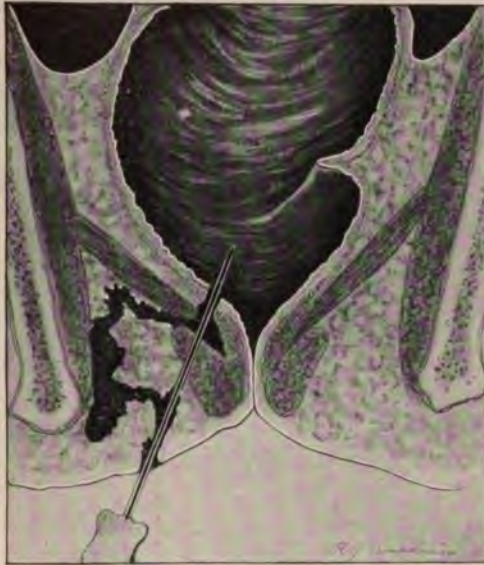


FIG. 144.—DIRECTOR PASSING THROUGH INTERNAL AND EXTERNAL OPENINGS OF FISTULA AND LEAVING PART OF TRACT UNTOUCHED.

claim that it is wise to incise the rectal wall up to the highest point of such cavities. This, however, is rarely necessary. If the parts are thoroughly drained and the sphincters put at rest by stretching and incision, these cavities will rapidly fill up by healthy granulation, and the cutting of the internal sphincter will be avoided. If, however, there should be a burrowing tract involving only the mucous membrane of the rectum, it is safer to lay this open. In order to avoid hæmorrhage, the heated knife should be used for this purpose. All burrowing tracts and diverticuli should be freely laid open into the main wound. Where the fistula is connected by burrowing tracts with the retro-rectal or pelvi-rectal spaces, these cavities should be opened into the general wound and drained by the introduction of rubber tubes.

The dressing of the wounds after all these operations for fistula is the same as that already described; they should never be packed tightly, inasmuch as this holds the tissues apart and results in delayed union with extensive cicatrices.

Complex Fistula.—Quite a large percentage of fistulas are of the complex variety. Any perirectal abscess or fistula, if improperly drained,

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Subtegumentary fistulas at any point on the anal circumference may burrow subcutaneously in all directions, because there are no connective-tissue walls to obstruct them. Those situated anteriorly are likely to extend forward into the perinæum and scrotum or upward into the cruro-scrotal fold. Those situated posteriorly burrow outward into the buttocks, or upward behind the coccyx and sacrum beneath the skin. The extent to which these subcutaneous burrowings may take place is very remarkable. In one case a small anterior fistula burrowed forward through the perinæum and crural folds and upward into the iliac region, opening upon the skin at a point near the anterior superior spine of the ilium. In another case (Fig. 147) a superficial fistula burrowed upward outside of the sacrum and coccyx, turned anteriorly above the level of the fourth sacral vertebra, passed underneath the gluteal muscles, and opened at a point just below the greater trochanter.

An apparently simple, direct, subtegumentary fistula may have a tract burrowing upward into the ischio-rectal fossa (Fig. 145) or even entering the superior pelvi-rectal space. Submuscular fistulas passing



FIG. 145.—FISTULOUS TRACT PASSING THROUGH EXTERNAL SPHINCTER.

through the ischio-rectal fossa are very liable to have burrowing sinuses leading off from them into the fossa of the opposite side, or into the retro-rectal space (Fig. 146). Where they extend around the anterior or posterior commissure of the anus they are called horseshoe fistulas.

It has frequently happened that small subcutaneous fistulas, after having been laid open, continue to suppurate for long periods, and upon close examination in these cases it has been discovered that small sub-mucous tracts were burrowing upward beyond the internal opening of the fistula.

The treatment of these varieties of complex fistula has been practically described under those of general operations. It consists in the incision and thorough drainage of every burrowing tract, whether it be superficial or deep. In the superficial variety excision and immediate suture may be applied. Where simple incision is employed the

cutting should always be made beyond the limit of the burrowing of the tract for the reason that the edges of the skin rapidly retract and may very easily form a pocket before healing from the bottom has taken place. It is necessary to say something upon the treatment of fistulas opening at remote distances from the anus. In certain of these cases the large amount of tissue involved and the extent of the wound necessary to lay open the entire tract creates a condition entirely out of proportion to the gravity of the disease. In the case opening near the trochanter (Fig. 147) the laying open of the fistulous



FIG. 146.—SUBTEGUMENTARY FISTULA INVOLVING ISCHIO-RECTAL AND RETRO-RECTAL SPACES.

tract would have involved the cutting of the gluteus maximus and medius, the gluteal artery and lesser sciatic nerve, together with a wound of no less than 18 inches in length. In such cases it is advisable to follow the fistulous tract from the external opening as far as possible with a long probe, and at that place make a counter opening large enough

to admit a drainage-tube into it. From this incision the probe can then be introduced still farther and a second counter opening made as before, and so on until one is made at a site about 1 or 2 inches from the anal margin. From this point to the internal opening of the fistula all the overlying tissues may be cut through, and the condition treated as one of complete fistula extending from the last counter-opening. The fistulous tract beyond this last counter-opening is treated by euretting, stimulating applications, and drainage. As a rule they will close rapidly and completely. Of course if there should be lateral burrowing tracts from this main fistulous canal, it would be necessary to lay these open and drain as has been previously described.



FIG. 147.—LONG FISTULOUS TRACT OPENING NEAR THE GREATER TROCHANTER.

Fistula with more than One External Opening; Watering-pot Fistula.—When a fistula has existed for an indefinite length of time and the drainage has been insufficient, numerous burrowing tracts may form and each open externally upon the skin. In this manner there will be established what has been described as watering-pot fistula. The number of such external openings is unlimited. Goodsall and Miles have described a case in which there were forty-three separate and distinct external apertures. This by no means implies a multiplicity of internal openings, for in the majority of these cases there is only one.

The number of external openings, however, does bear some relation to the size of the internal opening, to the constitutional condition of the patient, and the duration of the fistula (Goodsall and Miles, p. 117). Ordinarily in cases with numerous external openings one will find a large internal opening, generally between the two sphincters, and into which the ends of one or two fingers can be introduced. Sometimes a soft, flexible probe introduced through this internal opening will pass directly out through the primary external opening, and where there is any doubt in the mind of the patient as to which of these occurred first, this may prove a practical solution of the problem.

The treatment of this condition will depend largely upon the consti-

tutional condition of the patient. As a rule it would be well to lay open all the fistulous tracts into one large cavity, preserving as far as possible the islets and tongues of skin in order to facilitate the cicatrization and healing of the parts; but such patients are apt to be much debilitated and weakened by the excessive discharges, and extensive operations are therefore inadvisable. If it is possible to follow the tract from the internal to the primitive external opening, it is better to lay this open, curette and cauterize the same, and trust to the drainage thus obtained to heal the other openings and the sinuses leading to them. In case that does not succeed, the patient's condition will in the meantime be improved by constitutional treatment and the checking of septic absorption, and he will be in a better condition to tolerate incision of all the collateral tracts.

Excision and suture are impracticable in cases of this kind. Many of those which the author has seen have been associated with constitutional syphilis, and, while not being complicated by any syphilitic stricture of the rectum, they have proved obstinate to treatment until the effects of mercury and iodide of potash have been well established.

Fistula with more than One Internal Opening.—This variety is much more rare than the preceding. There may exist two internal openings connected with two distinct fistulas, or there may be two or more connected with only one external opening. It may be caused through puncture of the rectal walls by a sharp bone, needle, or other foreign body caught crosswise in the rectum and setting up two distinct abscesses and fistulous tracts upon opposite sides. These abscesses may burrow, coalesce outside of the rectum, and open by one common external aperture. It sometimes happens also that in a horseshoe fistula or double abscess of the ischio-rectal fossæ, an opening may occur within the rectum on each side, whereas only one exists externally.

The treatment of this variety depends entirely upon the anatomical character of the fistulas; if they are subtegumentary they should be laid freely open or dissected out and the wound sutured; if, however, the tract is submuscular it would be unwise to attempt an operation by incising both tracts at the same time. It is better to lay open one tract thoroughly through the sphincter muscle, extend the incision laterally so as to establish complete drainage, and at the same time cauterize the other openings and tracts with a saturated solution of nitrate of silver. If necessary secondary operations may be performed after the first has healed, and ordinarily the remaining fistula will be so reduced that excision with immediate suture can then be performed with safety.

Horseshoe Fistula.—This consists in a fistulous tract surrounding the posterior or anterior commissure of the rectum. Occasionally one finds

both conditions in the same patient, the fistula thus forming a complete circuit of the rectum (Fig. 148).

The typical horseshoe fistula consists in a tract that runs from one ischio-rectal fossa above the aponeurosis of the external sphincter and around the posterior commissure of the rectum into the fossa of the opposite side. It may have one or two external openings; it may have one, two, or no internal openings; as a rule there is one external opening upon one side or the other of the anus, and one internal, usually at the posterior commissure of the rectum just above the margin of the external sphincter.

It is said by competent operators that this type of fistula is rarely tubercular, and my experience coincides with this opinion. The posterior variety is generally submuscular, in that it is above the level of the external sphincter and passes above its aponeurosis. The anterior variety is generally subtegumentary, owing to the fact that there is no deep cellular tract between the perineal body and the anus. The fistulous tract may therefore be of considerable depth at each side of the perineal body, but is superficial as it crosses the anterior commissure.

Treatment.—The anterior variety may be dealt with either by the open method or by excision with immediate suture. When there has not been much burrowing and there are no tracts leading into the scrotum and crural folds, they may be dissected out and the wounds closed. This is generally an easy operation owing to the fact that fistulas in the anterior quadrants of the rectum usually open into the rectum quite low down, and ordinarily have no deep, burrowing tracts that extend up along the rectal wall. The tract generally consists in a well-developed, more or less globular cavity on each side of the perineal body connected by a narrow, superficial tract that runs underneath the skin from one cavity to the other, and resembles a curved dumb-



FIG. 148.—TRACT OF HORSESHOE FISTULA OPERATED ON IN SEPTEMBER, 1901.

bell more than a horseshoe (Figs. 149, 150). The lateral cavities are not very deep, being ordinarily limited by the triangular ligament.

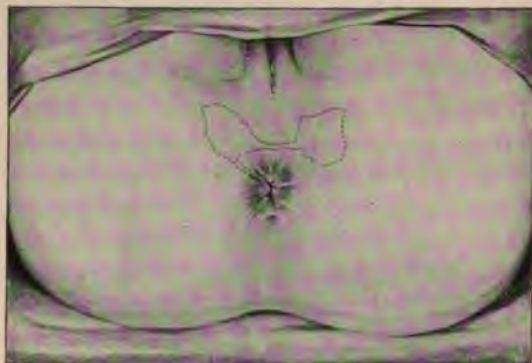


FIG. 149.—DUMB-BELL FISTULA.

Excision and suture are therefore practicable, but it requires skill and a complete knowledge of the anatomy of the parts to avoid the blood-vessels and nerves which traverse this area. Where the condition does not warrant an attempt at this method of treatment, the fistula should be laid open by careful dissection, the ends of the sphincter muscle being cut squarely across and pulled to one side while the cicatricial tissue is removed. It is not safe to use the cautery freely in this area as the sloughing which follows it may implicate the urinary organs, but gentle curetting and the application of carbolic acid to the tract may be safely used. After this the parts should be packed lightly with absorbent gauze soaked in oil and balsam, or in glycerin and ichthyol. In women great judgment must be exercised in this class of cases not to destroy too much of the perineal body; excision and immediate suture should always be performed if possible.

In the posterior horseshoe fistula the internal opening is usually situated near the posterior commissure and between the two sphincters. It is generally of considerable size, and can be made out distinctly by digital touch. The lateral burrowings may be superficial, but generally they extend deeply into the ischio-rectal fossa upon each side. The external opening may be upon either side, or there may be openings on both

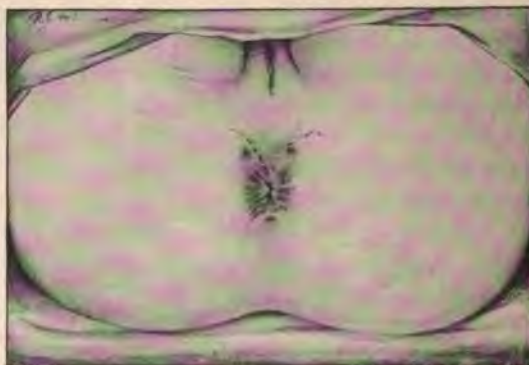


FIG. 150.—RESULTS OF OPERATION IN PRECEDING CASE.
The little pits on either side represent retracted ends of transverse perineal fibers.

sides. The cavities in such fistulas are generally so irregular that excision with immediate suture is not very practicable. In most of these cases the entire fistulous tract around the posterior commissure of the anus is laid open from one side of the rectum to the other, always carrying the incision in the skin a little beyond the extremity of the burrowing. After this has been done and the parts have been thoroughly scraped out, a grooved director is passed from the incision posteriorly through the fistulous opening into the rectum, and the intervening tissues are cut through. Frequently a considerable amount of dense, nodular, cicatricial tissue is found at this point. When such is the case it should be dissected out. Goodsall advises allowing the fistulous tract between the posterior wound and the rectum to remain untouched, and states that this method has three advantages, viz.: that hæmorrhage can be more readily controlled by plugging the wound; that when the bowels move the wound will not be soiled by the escape of fæces or flatus; that should the fistula be closed without the division of the external sphincter there can be no loss of power even in that muscle. Neither hæmorrhage nor division of the sphincter at this point are ever serious, and soiling by fæcal material is not so inimical to healing as constant reinfection from a fistulous tract. This is the same old story which has been so often told in the treatment of fistula—an attempt to cure the condition by leaving the pathological cause untouched. If it were necessary to choose between leaving this portion or the lateral tracts unopened, by all means select the latter, as complete healing would be much more likely to take place.

Quénu and Hartmann advise laying open the fistulous tract leading from the rectum to the transverse canal by an incision going well back toward the coccyx, then introducing drainage-tubes into the lateral tracts and keeping them washed out with antiseptic solutions. They claim to have obtained excellent results by this method. The objection to laying open all the lateral tracts at the same time that the fistula is opened lies in the fact that sometimes the whole anus will be almost surrounded by the incision, thus dissecting it loose from its lateral and posterior attachments, so that retraction and deformity will follow. While this deformity does not result in incontinence, it produces a sort of funnel-shaped approach to the anus which it is very difficult to keep clean. Besides this, the large cicatrices are occasionally tender and painful.

Another method consists in cutting through the fistulous tract into the posterior channel connecting the lateral cavities; a probe is then introduced into each of these and carried circularly forward until the end rests beneath the skin at its anterior limits; counter-openings are made at these points and two or three strands of large-sized silk drawn

through, their ends tied together and left in the wound as a sort of seton. The sinuses can be washed out daily with antiseptic solutions; the threads should be left in for ten days, at the end of which time healthy granulation will develop and the sinuses will heal within four or five weeks, the skin overlying them remaining perfectly healthy. Where the lateral tracts burrow deeply upward instead of circularly around the rectum, this method would not be advisable. Incision and drainage after the method of Quénu and Hartmann, together with cauterization by carbolic acid or iodine, or, if one prefers, by the saturated solution of nitrate of silver, will be better.

There is no advantage to wait, as is suggested by Goodsall, for two or three weeks after incising the fistulous tract before applying the cautery. It is best to dry out the wound at the time of the operation and apply the cautery then and there. The use of the thermo-cautery in deep abscess cavities is not advisable owing to the fact that sometimes extensive sloughing follows this operation, and if the instrument approaches too closely to the wall of the gut necrosis of the tissues may take place, and a secondary and high opening may be produced.

After the fistula has healed, if the retraction of the rectum causes any great inconvenience, or there be any incontinence, the cicatrices may be dissected out, the anus loosened from its new attachment and brought down and sutured in its normal position.

COMPLICATIONS IN OPERATIONS FOR FISTULA

The complications likely to arise in operations for fistula may be divided into immediate and secondary. The *immediate* are those that occur during the operation, and the *secondary* those that occur after it is finished.

Immediate Complications.—*Discharge of Intestinal Contents over the Operative Field.*—This is one of the most annoying of the immediate complications. The introduction of a large sponge into the rectum is advised to provide against this accident, but sometimes, notwithstanding this, the intestinal contents will be forced through and soil the wound. When the accident has happened in operating by excision with immediate suture, students have asked whether it is possible to obtain immediate union under such circumstances. Reasoning from pathology and the knowledge that the intestine always contains a certain number of septic and pyogenic germs, one would answer this question in the negative; from experience, however, it is known that faecal contamination is not always fatal to primary union of wounds about the rectum. Such accidents can be largely prevented by thoroughly cleansing out the bowels

the day before operation and practising massage over the descending colon and the sigmoid flexure before cleaning the parts, at the same time holding the anus open by a Sims's speculum and a rectal retractor. By these means the contents of the bowel are all carried down into the rectum, and can be washed out by irrigation. The administration of a hypodermic of morphine about half an hour before the operation will also assist in preventing this accident, a precaution that has a doubly beneficial effect, in that it reduces very largely the amount of anæsthetic necessary, and also controls to a certain degree the peristaltic action of the bowels. When the discharge once occurs the operation should be stopped, the sponge removed, and the rectum thoroughly irrigated with a 1-to-2,000 bichloride solution. The rest of the procedure should be carried out under constant irrigation with a 1-to-4,000 solution of the same drug.

Hæmorrhage.—Serious loss of blood during an operation for fistula is rare at the present day. There are so many means of hæmostasis that it is seldom one will meet with a hæmorrhage which he can not control at once.

If an artery be cut high up in the rectum, it can be grasped by long-pressure forceps and held until a ligature can be thrown around it. If the tying of this should be impossible, the forceps may be left on for twenty-four or thirty-six hours, and the hæmorrhage will be completely controlled. If it is intended under such circumstances to suture the wound, one will invariably be able to stop the hæmorrhage by passing several sutures underneath the entire wound and tying them tightly. Where suturing is not intended, the actual cautery applied to the bleeding surfaces will effectually control the hæmorrhage and in a sense sterilize the wound.

In cases in which there is a general and free oozing, it may be checked by the use of hot saline solutions applied by compresses in the wound. It is well to have such oozing checked before applying the permanent dressing, and except in rare instances the patient should be kept under anæsthesia until this has been accomplished.

Spouting vessels should be controlled by torsion or ligature. Many operators depend upon firm packing of the wound to control bleeding after these operations, and it is usually satisfactory, but great care is necessary in applying it to see that the pressure is exerted upon the proper tissues, especially when the wound extends well up in the rectum. It should be remembered that the chief blood-vessels lie in the mucous and submucous tissues and not in the deeper layers of the wound; and that if the edges are everted and the pressure is not brought to bear upon them, the mouths of the vessels may be exposed in the rectum, and thus the bleeding will continue. The rectum should be held open during the

dressing by a duckbill speculum and rectal retractor, in order that the pressure can be accurately applied.

Hæmorrhage is very likely to follow operations done under local cocaine anæsthesia. As is well known, this drug contracts the arterioles to such an extent that they bleed very little; and so long as its effects last one may have an almost bloodless wound, whereas after its influence wears away the parts sometimes bleed excessively.

It is important therefore when one operates with it to require the patient to remain quiet for one or two hours until the influence of the drug has entirely disappeared; after this the superficial dressings should be removed, the parts examined, and if there is any evidence of bleeding the wound should be more firmly packed or the vessels tied.

Another point which it is necessary to remember with regard to hæmorrhage is the possibility of a ligature's slipping after it has once been applied. This may be due to the fact that a very slight hold has been taken upon the vessels in the first place, or that the operator has pushed the ligature off in crowding a dressing into the wound. There is no necessity or advantage in the applications of alum, perchloride of iron, or other styptics in cases of this kind; they all irritate the parts, form a hard, fragile clot, which, when the dressings are removed, is very likely to slip out and cause hæmorrhage to recur; they delay healing and accomplish nothing which can not be done by plain hot water or firm pressure from dressings properly applied.

Complications of Anæsthesia.—These are not peculiar to rectal operations, and need not be entered into in detail here. One precaution, however, should be mentioned, viz., in administering chloroform the mask should always be removed when the sphincter is stretched, as this excites deep respirations, and too much of the drug may be inhaled suddenly and cause fatal results.

Secondary Complications.—The secondary complications in operations for fistula are described as *early* and *late*. Of the early complications the most important are retention of urine, involuntary fæcal passages, shock, and sepsis.

Retention of Urine.—There is nothing peculiar in the retention of urine following operations for fistula. It is of the same character as that seen after almost every surgical procedure in the rectum.

In operations about the anterior quadrants of the rectum one should always remember the possibility of injuries to the urethra, and also the fact that much manipulation and traumatism of these parts may result in an acute congestion of the periurethral tissues, which will cause a temporary œdema and constriction of the urethral canal. In such cases it will sometimes be found impossible to pass an ordinary soft-rubber or flexible catheter into the bladder, and one should always be provided

with a sterilized silver catheter in order to be able to draw the urine. As soon as the congestion subsides these symptoms of stricture rapidly disappear. It is advisable to induce the patient to urinate if possible before attempting to catheterize him, even if he has to stand on his feet to do so. It is well to wait for from twelve to fourteen hours before resorting to the catheter, only varying this rule in such cases as suffer from distention of the bladder. A certain amount of cystitis and atony of the bladder may be developed by too long delay, but it very much more frequently occurs as a result of too frequent and too early catheterization, even under the most careful antiseptic precautions. The catheter itself may be perfectly sterilized, the operator as clean as antiseptics can make him, and yet the walls of the anterior and deep urethra can not be sterilized, and the slightest traumatism or abrasion, such as may be produced by the softest instrument, will sometimes set up urethritis and cystitis which will require months to cure.

Firm packing may not only cause retention of urine, but also render the passage of the catheter impossible. When this occurs the dressings should be removed, and frequently after this is done the patient can pass urine voluntarily. In all cases before the catheter is passed the anterior urethra should be flushed with boric-acid solution. This subject is more fully discussed in connection with operations for hæmorrhoids.

Involuntary Defecation.—If the bowels have not been thoroughly emptied before the operation, the patient may have a pressing desire to defecate immediately after recovering from the anæsthetic, or he may even do so involuntarily before consciousness is restored. In such cases, if excision and immediate suture has been practised, the parts should be irrigated with a 1-to-2,000 bichloride solution, gently dried, and the dressings reapplied. If the open method has been practised, only such dressings as are disturbed or soiled by the passage should be removed.

When the patient after becoming conscious complains of a pressing desire to defecate, one should not insist upon controlling it too long; a concealed hæmorrhage in the rectum will sometimes occasion this, and if that is the case it is very important to find it out at once; therefore, when the desire is at all pressing, the superficial dressings should be removed and the patient allowed to relieve himself. Occasionally nothing more than a small amount of gas or a little fluid will come away, but no harm will result from this, and it will remove all doubt as to concealed hæmorrhage.

Shock.—Surgical shock may follow operations for fistula; especially is this likely if the patient is much exhausted from long suppurative processes, or if the operation is an extensive one and done by the actual

cautery; a slight hæmorrhage is not nearly so likely to produce this result as deep and extensive cauterization. On account of this fact the use of the Paquelin in large burrowing tracts with great destruction of tissue occurring in weak and debilitated individuals is not to be advised.

The symptoms and treatment of this condition are laid down in every work upon general surgery, and do not differ in cases following operations upon the rectum, except in one point: it is not practicable to employ rectal injections of hot saline solutions, because the dressings would have to be removed and the impairment of the sphincter would allow the fluid to come away at once. Hypodermoclysis and intravenous infusion are the practical means of treating this condition in these cases.

The writer is a firm believer in the use of large doses of morphine in surgical shock, excepting where the kidneys are diseased. It quiets the nervous excitement, reduces the frequency and increases the depth of the respiration, and is at the same time more or less of a heart stimulant. Nitroglycerin is also an excellent remedy if administered in doses sufficiently large to produce its physiological effect. Hot packs and alcoholic stimulants are also useful. For general instructions upon this subject, however, the reader is referred to the modern works upon general surgery.

Sepsis.—Acute sepsis sometimes follows operations for fistula. It may develop within the first few hours, and does not often do so later than the third day. When it occurs it assumes the form of diffuse peri-proctitis, a condition which has been already described. It is this complication which renders it imperative to take every antiseptic precaution in such operations notwithstanding the fact that pus is already present. A mild form of sepsis which results in secondary abscesses is sometimes seen. In these cases incision and drainage is the rule to be followed.

Late Complications.—Of the late complications in operations for fistula the most important are incontinence of fæces, extension of burrowing, irregularity of healing, persistent discharge, and partial prolapse.

Incontinence of Fæces.—This condition has been discussed so much that it has become a nightmare to the profession and a stumbling-block to every layman suffering from fistula. It is the shibboleth of the charlatan by which he frightens the sufferer away from the regular surgeon and induces him to be content with the palliative treatment of his condition rather than submit to an operation accompanied by such a risk.

It does not occur with anything like the frequency that is generally attributed to it. In a large number of observations the author has met with only one case of partial incontinence following a successful operation for fistula in its early stages; other instances have resulted from operations upon old, extensive fistulas with burrowing tracts or multiple

openings which have been long neglected, or which have been imperfectly operated upon in the beginning and failed to heal.

Incontinence may result from simple divulsion of the sphincter, but in such cases it is associated with some form of spinal or nerve disease on account of which the tonicity of the muscles is not properly re-established. A single irregular, diagonal, or jagged incision of the sphincter may result in such vicious union that the patient will not possess normal faecal control, but such incisions will not be made if the technique described above is carried out.

Some authors hold that if the internal sphincter is preserved, one may incise the external in any direction without danger of incontinence (Fig. 151). While this may be true to a certain extent with reference to unconscious faecal passages, it certainly is not so with reference to the voluntary control. A patient with the external sphincter destroyed may never have a stool unconsciously, but when the contents of the intestine reach the ampulla of the rectum, it will be impossible to control it long enough for him to reach the toilet if the stools are thin and he is at an inconvenient distance. The integrity of the external sphincter is absolutely necessary for the *voluntary* control of the anus. This integrity does not preclude the possibility of the muscle's having been severed and reunited. It is only a question of the muscular fibers uniting end to end or through such a narrow plane of cicatricial tissue that their length

will not be materially increased. It is on the same principle as a fibrous union between two fragments of a fractured patella. If the fibrous union is narrow and firm, functional action will not be impaired. If, however, the parts are united by long, fibrous bands, the functional action of the vastus muscle will be practically destroyed. So in the sphincter, when its fibers have been incised and are separated by wide cicatricial masses, the length is so increased that sufficient contraction to thoroughly close the anus is practically impossible. Oblique incisions of the muscle allow the divided ends to slide upon one another, thus lengthening the muscle and bringing the internal fibers of one end in contact with the external fibers of the other (Fig. 152). This vicious

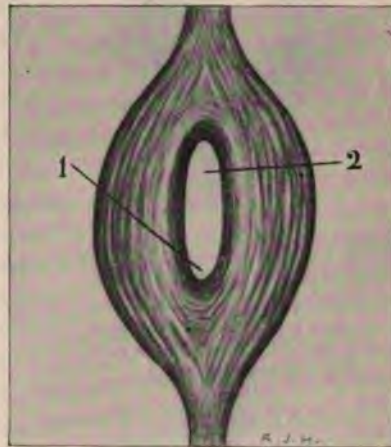


FIG. 151.

1, oblique incision of sphincter which is frequently followed by incontinence. 2, transverse incision not likely to result in same.

union is always followed by more or less incontinence. The large majority of cases of incontinence following operations for fistula could be avoided if the external sphincter were cut squarely across and the ends sutured together, or the packing so applied as to separate the ends very slightly.

Where the fistula passes through the external sphincter muscle, involving only its lower portion, these fibers may be severed with impunity, and the necessity of suturing may not appear; but where the entire external sphincter is cut and the edges of the wound retract to a considerable distance, one must always be prepared to meet with a certain amount of incontinence following the operation.

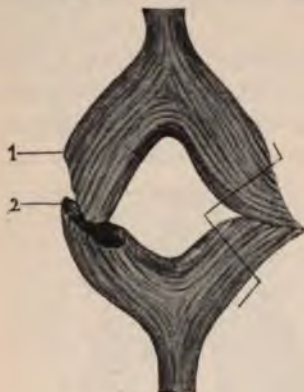


FIG. 152.

On the left is shown the separation and lengthening of the muscle (1 to 2) due to oblique incision. On the right is seen the vicious union of the fibers and the line of incision for repairing the muscle.

It has been claimed that incontinence never results from a single incision of the sphincter muscle, but this statement can not be substantiated. It is not a question of one or two incisions of the muscle so much as it is of a close and accurate reunion. The muscle may be cut twice, three times, or oftener, and if it be immediately reunited no incontinence will result. A number of cases have been reported in which it has been cut at two or three different points without immediate

suture, and without any incontinence resulting. The reports are all too meager to prove that the entire external sphincter was severed; it is probable that in the majority of them only the lower segment of the muscle was cut. Where the muscle is completely severed in more than one place, unless it be immediately sutured the retraction will necessitate such a wide cicatricial union that functional activity will be much impaired. There are cases, it is true, in which both sphincters have been severed at several points or entirely removed, and in which the anal outlet and lower end of the rectum is left as a narrow, cicatricial canal, and yet these patients suffer from no incontinence. These exceptions only prove the rule.

When the external sphincter is incised more than once, or by oblique incision, or where the ends are separated in union by a wide cicatrix, incontinence will almost always follow. The question therefore arises what is to be done in such cases.

Treatment.—Where the incontinence is partial, much relief may be obtained without operative interference. Galvanism, hot fomentations,

and the persistent passage of medium-sized bougies have some influence in hastening the absorption of cicatricial deposits, and will sometimes entirely cure these patients. They should be tried in all such cases before resorting to operative procedures.

Operative Treatment.—The ideal method for the relief of incontinence consists in restoring the continuity of the muscular fibers. The possibility of accomplishing this will depend first upon the amount of the muscle destroyed by the original operation and subsequent sloughing of the tissues; and, secondly, upon the length of time which has elapsed since the operation. Where the destruction of tissue has been very great, the muscular fibers left may be too short to be brought into contact. This is fortunately not often the case. More frequently incontinence is the result of an imperfect and irregular union of the muscle, as exhibited in Fig. 152. It will be seen in such cases that the union of the fibers allows only a few of them to act at all; that the distance between the fixed portions has been so increased that the utmost contraction will not close the anal aperture, and that the corresponding fibers of the muscle which have been incised are not in contact with each other. The operation indicated in these cases is shortening the muscle and bringing into normal apposition its two ends.

The method usually advised to accomplish this consists in freshening the edges by taking a V-shaped piece out of the angle, as is shown in Fig. 153, and suturing the parts together. It is perfectly clear that such an incision will not shorten the elongated muscle materially, neither will it enable one to bring the corresponding fibers into apposition with each other. If the V-shaped incision is inverted, as shown in Fig. 152, causing the two legs to diverge outward, thus cutting the fibers squarely across, the muscle will be shortened and the fibers can be brought into a comparatively normal apposition. This incision having been made, the tissues intervening between the legs of the incision should be excised, the ends of the muscle dissected out and sutured squarely together by chromicized catgut. After the ends have been sutured together, it is well to pass a silver wire or catgut tension suture through the skin and sphincter muscle at some distance from the incision, carrying it across the wound and out through the muscle and skin on the opposite side. After the wound has been closed this suture should be tied over a pad



FIG. 153.—OLD METHOD OF REPAIRING SPHINCTER.

of iodoform gauze so as to prevent tension upon the sutures that hold the ends of the muscle together until they shall have sufficient time to unite; it is allowed to remain in position for five to eight days, according to the amount of irritation it produces. Another plan to accomplish this same end is by passing around the anus, on a level with the superior border of the external sphincter, a buried kangaroo tendon, and, tying it firmly upon the index finger, introduce it into the anus as is done in the operation for prolapse.

In this operation the mucous membrane should be dissected up from the muscle before the latter is incised, and after its ends are brought together the membrane should be sutured back into position; none of it should be destroyed. It is needless to say that it is important to check all oozing and bring together the deeper portions of the wound from which the segment of cicatricial and muscular tissues has been excised, before closing the incision.

The patient's bowels should be confined for six to eight days after such an operation, at which time they should be induced to move by injections of oil and glycerin in the proportion of three to one. These injections should be repeated twice daily until all the hard, faecal masses have been removed, after which time the patient may be given a laxative by the mouth. The fact that a patient develops an elevation of temperature of 1, 2, or 3 degrees during this period of constipation should not alarm the surgeon, although it is necessary to carefully examine the wound daily to be sure that no suppuration and abscesses form in the parts.

Where sepsis does occur and a small abscess develops, it is not necessary to lay the whole wound open; it should be treated simply by incision and drainage in such a direction that the united ends of the sphincter will not be separated.

Where the sphincter muscle has been divided in more than one place, it is advisable to divide the operation into two or more steps, suturing at the first sitting all the incisions upon one side, and leaving those upon the other for a future operation. By attempting to unite all the parts at once, too great tension upon the ends of the muscle may develop, and too much inflammatory reaction may be set up in the parts for proper healing. Where the operation is done upon one side alone little tension will occur, and union will not often fail. The second operation may be attempted at the end of three or four weeks after the first.

The patient should be absolutely confined to bed after such an operation, and the buttocks, after the dressings have been applied, should be strapped together with a broad band of adhesive plaster in order to prevent any traction upon the wound which might occur from

these parts being caught and dragged upon by the bed-clothing. If the internal sphincter has been divided, its ends should be dissected out and sutured together, but here it will be impossible to use the tension suture.

Where incontinence has existed for long periods of time, the muscular fibers may become so atrophied that it will be impossible to recognize them and bring their ends together. Indeed, they become degenerated into fibrous tissue, and there is no longer any real muscle. In such cases the only relief which can be expected will be comparative. The narrowing of the anal outlet by a plastic process will benefit the

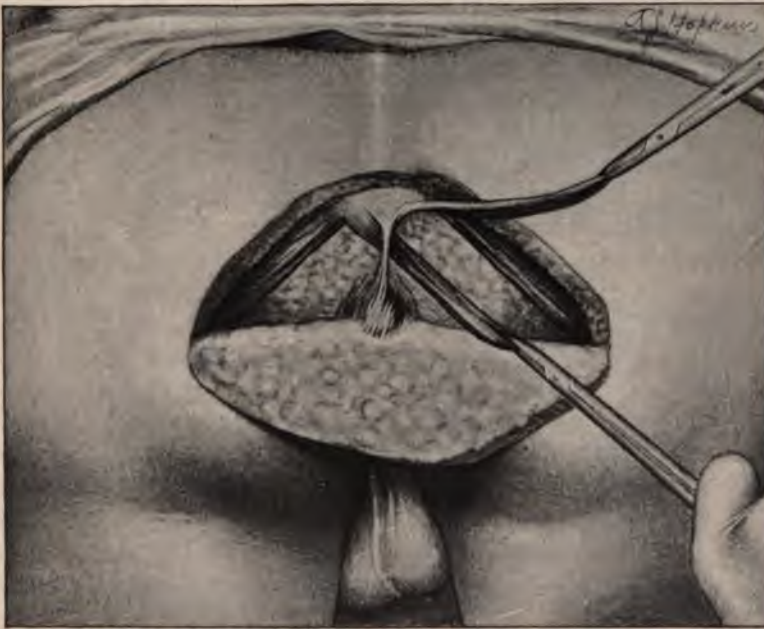


FIG. 154.—CHETWOOD'S OPERATION FOR FÆCAL INCONTINENCE—FIRST STEP.

patient considerably, but restoration of function is improbable. This should be explained to the patient before the operation is undertaken in order to avoid disappointment.

Chetwood, of New York, has succeeded in restoring the functional activity of the anus in a case of this kind by a most ingenious plastic operation. The patient suffered from absolute incontinence, and external examination revealed no evidence of the existence of a sphincter.

The doctor made a large semicircular incision extending from one tuberosity to the other, its convexity being directed backward toward the coccyx and a little beyond it (Fig. 154). The flap thus made was

turned forward, and the fatty tissue dissected away until the lower end of the rectum at the edges of the glutei muscles were exposed. A ribbon-shaped piece of muscular tissue about $\frac{1}{4}$ of an inch in breadth and $\frac{1}{16}$ of an inch in thickness was then dissected from the glutei muscles on each side, leaving an attachment at the coccyx. These ribbon-



FIG. 155.—CHETWOOD'S OPERATION—SECOND STEP.

shaped bands were made to cross each other beneath the ligamentous attachment of the anus to the coccyx; they were then made to encircle the rectum and meet anteriorly beneath the skin, the cellular tissue having been perforated by dull dissection. At this point they were sutured with chromicized catgut (Fig. 155). A very small remnant of

sphincter was found on each side of the rectum, and to this the new muscular strips were attached by sutures. The original flap was then sutured back in position and the wound closed with aseptic precautions. Aside from some slight sloughing in the edges of the wound there was no complication following the operation. An improvement in the patient's continence was established at once, and one year later the newly made sphincter exercised sufficient control on the bowel to retain its contents under all conditions.

The author has employed this method in five cases; in three the results were excellent, in two little improvement was obtained.

Kelsey advises the narrowing of the anus in such cases by the application of the thermo-cautery at four or five points around the anus. The cicatrices produced by the cauterization are often tender, irritable, and occasion considerable suffering. It sometimes happens also that this process of cicatrization involves a sensitive nerve, producing a perineuritis, and is followed by persistent neuralgic pain. This method is therefore to be avoided if it is possible to narrow the anal outlet by a plastic operation.

Prolapse of Hæmorrhoids and Mucous Membrane.—Occasionally following an operation for fistula the patient will suffer from prolapse of internal hæmorrhoids or mucous membrane into the fistulous wound. The hæmorrhoids may be present at the time of the operation, or they may develop afterward. Where the pile or the fold of mucous membrane

continually protrudes between the edges of the wound it will necessarily retard or prevent healing.

It is the practice of some operators to remove them at the time of the operation for fistula; ordinarily no complication follows it, but occasionally the hæmorrhoidal wound is infected by the pus from the fistula, and the patients suffer from long, protracted ulceration. This has usually been in the cases in which the fistula was very recent and there was a considerable amount of pus in the abscess cavity. Therefore, it is advisable to make this distinction in such cases: where the fistula is comparatively acute, and there is considerable suppuration present, no operation should be performed at the time upon existing hæmorrhoids. The stretching or cutting of the sphincter, together with the rest in a recumbent posture, will probably prevent the piles becoming congested, and obviate any interference with the healing of the fistula. If, however, one well-developed hæmorrhoidal tumor is situated right above the angle of the wound, it may be removed by the clamp and cautery at the time of operation for fistula, but it is better not to interfere with the others.

Where the fistula is chronic and associated with very little suppuration, if the operation of incision is to be done the hæmorrhoids may be removed at the same time with impunity. The clamp and cautery is by all means the best method to employ under these circumstances. If excision and immediate suture are to be done, the hæmorrhoids may be removed at the same time by the Whitehead method, but no operation resulting in granulation and suppuration such as the clamp and cautery, or the ligature, should ever be employed under these circumstances. If after an operation for fistula there should be a prolapse of the mucous membrane or the folding in of the mucous flaps of the wound into the fistulous tract, these folds should be removed as early as possible either by the scissors or the clamp.

This second operation may be performed under the influence of cocaine, but it is much better to chloroform the patient so that it may be thoroughly done, and the excision carried as high as is necessary.

Protracted Suppuration and Extension of Burrowing.—In a certain number of cases after operation for fistula the discharge of pus will not be materially lessened. Occasionally the suppuration will be protracted on account of the general unhealthy condition of the wound. This condition may be due to septic germs or to the constitutional state of the patient due to syphilis, etc.

Bright's disease, diabetes, cardiac disease, and anæmia are also causes of protracted healing in fistula. These conditions should always be recognized before an operation is done, and where they exist in a marked degree it should be limited to the least possible interference consistent

with the relief of the patient's sufferings. An incision into the external tissues large enough to thoroughly drain the fistulous tract is all that should be attempted under these circumstances. We have indicated already the course of procedure in cases where tuberculosis is responsible for delayed healing.

Occasionally after an operation for fistula, extension of burrowing will take place in one or more directions; if careful examination is made it will be found due to the fact that some small pocket or lateral tract has been imperfectly laid open, and the dressings have acted as a plug, preventing its drainage. Where the wound has been drained by very light packing or by drainage-tubes, such extension will rarely occur. If, however, it does take place, the burrowing tracts should be freely laid open upon the skin surface to a distance of $\frac{1}{2}$ an inch beyond its deepest portion, and drained as has been indicated heretofore.

Goodsall says: "The onset of pain in the wound after the first eighteen hours following an operation upon an uncomplicated fistula is always suggestive of extension of burrowing." The pain in these cases is of a throbbing, aching character, and is associated with chill, fever, and swelling in the neighborhood of the wound, resembling very much the symptoms of acute abscess. Immediately upon the appearance of such symptoms early after the operation, the dressings should be removed, and the burrowing tract or fresh abscess laid open and drained.

Premature and Irregular Healing.—Frequently after an operation for fistula, where the patient is not carefully attended and dressed, the superficial edges of the wound will unite before the deeper portions have contracted and filled up by granulation, thus leaving a cavity beneath them; or, owing to the imperfect application of the dressings the parts will be drawn out of shape and an irregular, puckered union will take place. Many cases of fistula recur owing to these accidents. It is a condition which should be prevented and not treated. There is no operation done upon the rectum which requires so persistent and extensive after-treatment as that for fistula, and the surgeon who is the most successful in the cure of these cases will always be found to be the one who gives his personal and individual attention to the dressing and care of his patient.

If from any neglect or accident the upper portions of the wound should unite before the deeper portions, they should be reincised or torn apart by the introduction of the probe or index finger.

A good plan to avoid such an accident is, when operating for fistula by the method of incision, to trim off well the skin and mucous edges of the wound for the distance of $\frac{1}{4}$ of an inch throughout its extent. By this means better drainage will be secured, and the dangers of premature union of the edges will be practically eliminated.

CHAPTER XII

COMPLICATED FISTULA

THIS class embraces all those fistulas which connect the anus and rectum with other organs, or which proceed from diseases of the bones of the pelvis and spinal column. The recognition of these conditions is very necessary, for the treatment is entirely different from that of other types, and errors in diagnosis may end disastrously.

Fistulas originating in Bone Disease.—Tuberculosis, osteosarcoma, and necrosis of the bones of the pelvis or spinal vertebræ result in abscesses and subsequent fistulas which open in the perianal region or into the rectum itself. Those which originate in disease of the sacrum or coccyx find outlets in the posterior quadrants of the perinæum, and involve the retro-rectal space; while those from the other bones of the pelvis or the vertebræ usually open in the anterior quadrants of the perinæum or into the rectum itself; but occasionally an abscess originating in the lower lumbar vertebræ burrows down between the folds of the peritonæum which form the mesorectum, and thus forms a fistula leading into the retro-rectal space.

The symptoms in such conditions are never those of acute abscess with chill, fever, pain, and swelling. They develop as *cold abscesses*, manifesting themselves by pain in the spine or legs with dull, heavy aching in the pelvis, interference with the fæcal and urinary passages, and finally present or break at some point around the anus or within the rectum. After the abscess has broken into the rectum it may still burrow downward and open upon the skin.

The point at which the rupture into the intestine occurs is very variable. It may be anywhere, from the internal sphincter to the upper limits of the pelvic colon. In a typical case of this kind the opening was about 2 inches above the recto-sigmoidal juncture.

J. S., boy, five and a half years of age, suffering from tubercular coxalgia, developed at first a small subtegumentary fistula at the margin of the anus. This was laid open, cauterized, and appeared to be healing without complications, when he began to suffer with distention of the abdomen, difficulty in fæcal movements, and dull pains in the pelvic region. The tumor could be easily felt to the

left of the lumbo-sacral juncture through the abdominal wall. It increased rapidly, and six days after it was discovered the child "felt something break," and shortly afterward had a movement of his bowels composed entirely of pus, and measuring, according to the mother's statement, fully two pints. She brought the child to the clinic on the following day, and while the external surfaces about the anus appeared to be perfectly healthy and the previous wound healing nicely, the rectum was found to be full of creamy pus. Under chloroform the sphincter was stretched, the rectum cleaned out and searched carefully for any point from which the pus might come, but in vain. With the tubular speculum, however, at a point about 2 inches above the recto-sigmoidal juncture, a linear rent about $\frac{1}{2}$ an inch in length was found in the bowel, through which pus could be made to flow by pressure upon the abdomen. The course of the abscess was doubtful, and manipulation with the probe at so great a distance might penetrate the peritoneal cavity, so the parts were irrigated as gently as possible through the speculum, which was then withdrawn. The mother was instructed to give the boy full enemata of saline solution daily, but not to purge him under any consideration lest violent peristaltic action should tear loose the adhesions and produce a peritonitis. The pus continued to be discharged from the rectum, until four weeks later the child began to complain of pain in walking, and careful examination showed a deep induration to the left, and in front of the rectum. After several days' poulticing and rest in bed, it was possible to make out this swelling through the perinæum. After deep dissection, a large pus cavity was found and opened. After this the discharge of pus from the bowel became rapidly less, and ceased entirely within one week. Tuberculosis of the vertebræ having been diagnosed in this case, the source of the pus was not difficult to determine. Under constitutional treatment, continual drainage, and irrigation the patient's health improved, and the suppuration largely decreased, but not until three other burrowing tracts had occurred in the buttocks and around the anus. The child lived for two years, seemed to be gaining in health and strength, and all the fistulous tracts, save one, had closed, when he was attacked with pneumonia following measles, and died at the age of seven and a half years. The necrosis in this case was seated in the ninth and tenth dorsal vertebræ.

The writer has seen a case of fistula passing downward and in front of the rectum, originating in an osteosarcoma of the ilium. An autopsy upon this case showed that the fistulous tract had burrowed downward below the inferior fascia of the levator ani muscle, passing behind the triangular ligament, and opened in the right anterior quadrant about 1 inch from the anus. The fistulous tract approached the rectal wall so nearly that nothing more than the mucous membrane seemed to separate the two cavities. It is not possible to give any statistics in regard to the frequency of fistula in diseases of the vertebræ, but to judge from the number which appear at the clinic they can not be very rare.

Subtegumentary fistula posterior to the anus and burrowing upward over the surface of the sacrum is not infrequent. It may sometimes be due to necrosis of the bones, but in many instances it is not. It is said by some authors to result from injuries during childbirth and falls or blows upon the coccyx. The author has seen a case which resulted

from a fall while skating that occurred in a man forty-five years of age, and was evidently due to necrosis following fracture of the coccyx.

The white, creamy character of the pus, its profuseness and persistency, notwithstanding free drainage and antiseptic irrigation, together with the antecedent history of the case, will generally indicate the nature of such fistulous tracts.

Treatment.—One must recognize in the beginning that the large majority of these cases are tuberculous, and conduct the treatment upon these lines. The only operative interference justifiable in such cases is to keep the tract well open at its lowest point in order to maintain drainage and prevent further burrowing. If the diseased bone can be reached and the necrotic tissues scraped out, this may be attempted; but at the present day this practice is opposed by many competent surgeons, who hold that where the entire diseased area can not be radically excised, it is better not to interfere with it at all, but depend upon improving the patient's constitutional resistance to the pathological processes. Thorough drainage, the support of the diseased parts by proper braces, the administration of tonics, cod-liver oil, and creosote, and change of climate will do more for these cases than local treatment or surgical operations.

The lines of incision for drainage in such cases are the same as those laid down for other types of fistula, and depend upon the location of the external opening. The sphincter muscles should be sedulously avoided, as their reunion is almost impossible with the constant flow of pus through the wound.

Fistulas connected with Other Organs.—Ano-rectal fistulas connecting with other organs have been very properly divided into the *urinary* and the *genital*. The first class is always connected with some part of the urinary tract: the urethra, the bladder, or the ureter. They are largely confined to the male sex, owing to the fact that in women the bladder and urethra are separated from the rectum by the interposition of the uterus and vagina. While it would be practically impossible to have a recto-urethral fistula in a woman, we do occasionally see recto-vesical fistula in this sex. There is rarely a simple fistula between these two organs, however, as it ordinarily involves the vagina as well, thus forming a recto-vesico-vaginal fistula. On the other hand the genital fistulas are nearly all found in women. Occasionally one sees a subtegumentary fistula burrowing forward into the scrotum, but such cases have no distinguishing features beyond the fact that they are very rare, and always superficial in the anterior portion of their course. They may be dismissed with the remark that they should be treated by incision, or better still by excision with immediate suture, just as any other subtegumentary fistula in ano.

Urinary Fistulas.—These may be classified as perineal, recto-urethral, recto-ureteral, and recto-vesical.

Perineal Fistula.—Fistulas in the perinæum that originate in the urinary tract sometimes burrow backward and open at some point around the anus, thus simulating ano-rectal fistula. They usually result from some disease in the posterior portion of the bulbous urethra or in Cowper's glands. It will be remembered from our anatomical studies that these parts are included between the layers of the deep and superficial fasciæ, and form a part of the anterior boundary of the uro-genital triangle. Abscesses or urinary extravasation occurring in this space may burrow forward around the anterior margin of the superficial fascia of the perinæum, and thence backward beneath the skin and perineal fascia, surrounding the anus and opening at points which make them appear as ano-rectal fistulas. In the case illustrated (Fig. 123), the fistula appeared to be of the horseshoe variety posterior to the rectum, and almost completely surrounded this organ. Careful dissection, however, revealed no connection between the fistulous tract and the latter organ. Two days after the operation urine was found in the wound, and finally the tract was traced around the anterior margin of the superficial fascia of the perinæum into the bulbous urethra. Such cases practically belong to genito-urinary surgery, but it is very important to recognize them, and thus avoid making incisions into the rectum when there is no connection between it and the disease.

Etiology.—The causes of these fistulas are diseases of the urethra, traumatism to the parts from a kick, blow, fall, or more frequently from the forcible introduction of instruments. False passages made by sounds or small urethral instruments in cases of stricture at the bulbous portion of the canal may be followed by abscess of the perineal space, as may also suppurative disease of this part, gonorrhœa, or tuberculosis of Cowper's glands, and the extravasation of urine through a rent in the urethral wall, and such abscesses often end in fistulas which simulate those of the ano-rectal type.

Diagnosis.—In these cases there will nearly always be a history of gonorrhœa, of stricture, or of traumatism. The patient will not complain of any pain in the anus or rectum unless the fæces are very hard. He may have difficulty of urination, and sometimes even inability to pass urine at all; there will generally be a history of chill, fever, pain, and swelling preceding the discharge of pus from the urethra or the opening of the abscess upon the skin; the finger in the rectum will not elicit any induration or abnormality in this organ, but if bimanual palpation be practised, induration in the perineal body can be easily made out. Examination with the probe will show that the deepest portion of the fistula is always anterior to the line between the two ischii, the abscess

being limited posteriorly by the triangular ligament. The pus in these cases is never feculent, but may have an odor of urine. Where there is any doubt with regard to the opening in the urethra several methods of diagnosis may be adopted. One may determine this by passing a sound into the urethra and then introducing a probe into the fistula. If the metals come in contact the urethral opening will be proved. The urethra may be suddenly compressed during urination, and the urine thus forced out into the wound can be recognized by chemical tests. This method was employed in the case mentioned.

A simpler method consists in administering to the patient a small capsule of methylene blue; after a few hours the urine will be stained with this material, and if it discharges into the abscess cavity there will be no difficulty in recognizing the fact. Where no urine passes into the fistulous tract one may safely conclude that the disease has originated outside of the urethra, either in the glands of Cowper or the perineal lymphatics.

The chief point in the diagnosis consists in determining the extra-rectal origin of the fistula, and as a general rule for this, one may say abscesses which develop anterior to the transversus perinei muscles rarely have any primary connection with the rectum.

Treatment.—The abscess or fistulous tract should be treated by drainage, curettage, and cauterization, such as has been advised in the treatment of ano-rectal fistula; but one should be careful in using strong cauterizing agents lest they invade the urethra and bladder, and thus set up an acute cystitis or urethritis. Where a stricture of the urethra is present, it is important that this should be dilated or incised before any attempt is made to heal the fistula. All suppurating conditions of the urethra should be overcome, and the urine rendered as non-irritating as possible. It may be a wise plan during the first two or three weeks of such treatment to catheterize the patient at stated intervals, never allowing any urine to pass through the urethra, and thus into the wound. The frequent passage of the catheter, however, may do more to retard the healing and keep up the inflammation than does the escape of a little urine. What concerns us most in the present discussion is the fistulous tract and its burrowing around the anus. With regard to this nothing more need be said than that excision with immediate suture is not likely to prove successful in these cases on account of the urethral discharge; therefore they had better be treated by simple incision, or if the case be of a tubercular nature, incision by the thermo-cautery and cauterization of the fistulous tract would be the proper course to pursue.

Recto-urethral Fistula.—This condition, as its name implies, consists in an abnormal communication between the urethra and the rectum. It always involves the membranous or prostatic portion of the

urethra, and usually the rectal opening is above the external sphincter. The condition, while comparatively rare, occurs sufficiently often to



FIG. 156.—RECTO-URETHRAL FISTULA.

1, tract running downward and backward, probably originating in urethra; 2, tract running downward and forward, probably originating in rectum.

deserve a detailed consideration from the fact that until recently no method had been devised which offered any assurance of its cure. The term urethro-rectal fistula would perhaps be more accurate, inasmuch as the majority of them originate in the urethra, and lead from this cavity backward and downward into the rectum. Moreover, the urine escapes into the rectum much more frequently than the intestinal contents into the urethra. This is not due, however, to the course of the fistula so much as to the size of the tract. The downward and backward direction of the tract is by no means invariable. In 10 cases seen by the writer, 3 of the fistulous tracts extended from the rectum downward and forward into the urethra (Fig. 156). In these cases it was probable that the fistula had its origin in the rectum, and hence the direction of the tract may in a manner indicate its source.

Etiology.—Traumatism and pathological processes may each account for these fistulas; they are therefore classified as *traumatic* and *pathological*. Of the traumatic variety the most frequent causes are false passages or punctures made by sounds or other instruments introduced through the urethra; small filiform bougies or pointed catheters may be arrested in the diverticula of the membranous or prostatic urethra, penetrate the same, and invade the recto-urethral septum, or even perforate the rectal wall, thus causing at once a complete fistula. It is not

necessary that complete penetration should take place in order that a fistula may result; if the urethral wall be torn, the abscess which follows extravasation of urine into the dividing septum will in all likelihood break through into the rectum, this being the direction of least resistance as compared with the dense tissues of the perinæum.

Internal urethrotomy or the divulsion of stricture in the membranous or prostatic urethra, operations for stone or enlarged prostate have all resulted in fistulas between the rectum and urethra. Fortunately most of these cases heal spontaneously owing to the free drainage of urine through the perineal incisions. Foreign bodies, such as pins, needles, pipe-stems, or fish-bones may pass from the rectum into the urethra, or *vice versa*. Traumatism of the perinæum that causes extensive sloughing, and impaling upon sharp instruments may also result in this condition, as has been shown by Legueu (*Annales des maladies des organes génito-urinaires*, 1893, p. 300). Rupture of the urethra in consequence of falls or crushing accidents may cause it, as may gunshot wounds. The writer has twice seen the accident follow excision of the prostate, and in one case result from an operation for hæmorrhoids.

Cancer of the rectum or prostate may by extension or sloughing result in a communication between the two organs; the communication in this disease is not nearly so frequent as it is between the bladder and the rectum, where it forms a recto-vesical fistula. This complication only occurs in very late stages of the malignant disease.

Tubercular, syphilitic, or simple ulcerations of the rectum may result in recto-urethral fistula through extension or through the formation of burrowing abscesses which eventually form communications between the two cavities. It is very rare, however, that these fistulas originate upon the side of the rectum. As has been stated, abscesses of the superior pelvi-rectal space rarely originate in the rectum, and therefore when recto-urethral fistulas result from these, the pathological cause is still to be sought in the genito-urinary apparatus. In tuberculosis of the rectum the prostate gland is nearly always involved in the same pathological processes, and it is impossible to say in which organ the fistula originates.

Diseases of the prostatic and membranous urethra are the etiological factors in the large majority of recto-urethral fistulas. Of these stricture is the most frequent. The mucous lining being destroyed and the wall of the urethra weakened, the obstruction to the current during micturition forces the urine out into the peri-urethral tissues, and it carries the pyogenic bacteria present in the canal; these organisms cause abscess which extends in the direction of the least resistance, frequently high up in the pelvi-rectal space, but sometimes directly through into the rectum. In the first instance if the abscess opens into the rectum

the resulting fistula will be indirect, long, and tortuous; in the second, it will be short and direct.

Abscesses of the prostate, whether simple, gonorrhœal, or tubercular, may result in this form of fistula; the capsule of the gland will prevent much burrowing, and the fistulous tracts will usually be direct and very short. They may open into the urethra first, and afterward invade the rectal canal, or the process may be reversed. Where they open into the urethra the danger that recto-urethral fistula will result will be much less than in those cases where the abscess breaks first into the rectal cavity. This fact emphasizes the danger of opening such abscesses through the rectum, if there were no other reasons for condemning the procedure. Forgue (quoted by White and Martin) states that 43 out of a total of 67 prostatic abscesses opened into the rectum, and in 21 of these pus was discharged by both rectum and urethra.* If these figures are correct, it is surprising that we have so few recto-urethral fistulas. Sometimes there is burrowing in these cases, and the openings into the rectum and urethra may be complicated by one in the perinæum or by blind lateral tracts.

Finally, calculi of the prostatic and membranous urethra or of the prostate itself are also occasionally the cause of this condition. In these instances the fistula may be produced by the sharp point of the stone cutting through the urethro-rectal septum, or by pressure ulceration, extravasation of urine, abscess, and breaking down of the walls.

Congenital recto-urethral fistulas have been observed, but they belong to the type of malformations. They are due to the absorption of the recto-urethral instead of the recto-anal septum in foetal life. When the normal anal orifice is established, the recto-urethral fistula will generally close spontaneously.

Symptoms and Diagnosis.—The characteristic symptoms of recto-urethral fistula are the passage of urine into the rectum or of gas and intestinal contents into the urethra. Both rarely occur in the same individual. The direction of the tract will determine the nature of the abnormal passages. The latter take place at the time of urination or defecation. The amount of such discharges will depend upon the size of the opening, the length and direction of the fistulous tract, and the amount of obstruction in the natural channel. A tight stricture of the urethra causes an excessive flow of urine into the rectum, and a spasmodic sphincter will result in an increased amount of fæcal matter being passed into the urethra. Escape of the intestinal contents into this canal is much less frequent than that of the urine into the rectum; this is accounted for by the prevailing direction of the fistulous tract, which

* The same figures are attributed to Segond. As the author has been unable to obtain the original articles, he can not state which reference is correct.

is downward and backward; by the size of the orifice, which is generally too small to admit any but fluid materials; and finally by the fact that the sphincters are not frequently so contracted as to produce much obstruction to fluid or semifluid materials. Sometimes, however, gas and faecal matter are forced into the urethra, and even solid masses have been known to pass through the canal after much straining and pain. In such cases there is always a large rectal opening, and the fistulous tract is short. When the urine passes into the rectum it is generally expelled immediately thereafter, owing to the intolerance by the rectal mucous membrane of this secretion. Sometimes this is not the case, and it is retained until the next defecation. In such instances it is difficult to distinguish between this disease and recto-vesical fistula. In the early stages there is always a discharge of pus from the rectum and urethra, but later on these cease almost entirely. In short fistulas the mucous membrane of the rectum becomes continuous with that of the urethra. Bernard has reported a case that occurred in the practice of Lallemand, in which the semen was expelled through the anus without any previous erection; in one of the cases in which the writer operated, spermatozoa were found in the pus collected from the rectum.

Rectitis and urethritis are constant symptoms in this disease. There is often diarrhoea and frequent micturition. According to Richet, the sphincter muscle loses its control, and Legueu states that the skin upon the buttocks and perinæum becomes excoriated, though in the cases which the author has seen neither of these complications has been observed. In one case there was a marked cystitis, and a swollen, oedematous condition of the urethral meatus.

Digital examination will always reveal the rectal opening, and where this is large enough to admit the tip of the finger, a sound introduced through the urethra can be easily felt. If the opening is small it will generally be surrounded by a considerable mass of cicatricial tissue; it may be in the shape of a pouting tubercle, or a depressed, crater-like cavity, but in either case the reed-like tract of the fistula may be felt beneath the mucous membrane of the rectum, running up to the urethra. By the aid of a fenestrated or Sims's speculum the orifice can be brought into view and a probe passed into it. Usually there is no difficulty in bringing the latter into contact with a metallic sound passed into the urethra. Sometimes the orifice is hidden in the folds of the rectum or within an anterior rectocele; in such cases the laryngeal mirror may be of service in discovering it. The only condition with which this disease is likely to be confounded is that of recto-vesical fistula. The diagnosis between these two conditions may be thus stated.

RECTO-URETHRAL FISTULA

Rarely congenital.
 History of urethral or prostatic disease.
 Contents pass from one channel to the other only during functional action.
 Amount of material passed is small and irregular.
 Discharge is generally from the urethra into the rectum.
 Cystitis and frequent micturition rare.
 Opening in rectum generally small and low down.
 Sound in urethra can be felt by probe or finger in rectum.
 Colored fluids injected into bladder do not appear in rectum until micturition takes place.
 Deposit of cicatricial connective tissue is generally large and easily felt with finger in rectum.

RECTO-VESICAL FISTULA

Comparatively often congenital.
 History of peritonitis or intestinal disease.
 Contents pass abnormally without regard to functional action.
 Amount of material passed is large and constant.
 Discharge is nearly always from the intestine into the bladder.
 Cystitis and frequent micturition always present.
 Rectal opening generally large and above the reach of the finger.
 Sound in urethra can not be felt through rectum.
 Colored fluids appear in rectum immediately after injection into bladder.
 Deposit of cicatricial connective tissue generally small and above the reach of the finger.

The prognosis of recto-urethral fistulas is favorable in those cases which result from operative procedures. Where they result from pathological processes, however, there is little or no tendency to spontaneous healing, and until recently all the methods advised failed in the large majority of cases to close the communication between the cavities.

Treatment.—The treatment of recto-urethral fistula has been as various as it has been unsuccessful. Writers of text-books upon surgery and diseases of the rectum recommend methods with which they have had no experience, and in which they have little confidence. Duplay (*Am. Encyc. Surg.*, vol. vi, p. 507) says: "While traumatic fistulas and those which follow acute and tolerably circumscribed abscesses present a good prospect of recovery, fistulas which follow in the train of diffuse and extensive suppuration, either idiopathic or of a tubercular nature, and which are accompanied by prostatic sinuses, are almost always incurable." And again (*Traité de path. extern.*, t. vii, p. 180) he says: "On the whole, if we had any examples of spontaneous cure of urethro-rectal fistula we might counsel that it is best to wait, as the chances of surgical interference are very slight."

Sir Henry Thompson concludes from an enormous experience that surgical intervention is rarely of great benefit, and that constant catheterization offers the best prospect of cure. He advises the use of the galvano-cautery, but frankly admits that he has never cured a case with it. Morris (*Treves's Syst. of Surg.*, vol. ii, p. 898) advises, from a theoretical point of view, catheterization and the splitting and scraping of the fistulous tract; he reports no cases as cured, but states that he has

benefited one by suprapubic cystotomy. Quénu and Hartmann ascribe excellent results to the operation of Sir Astley Cooper, but we have found only 1 case in which it has ever succeeded.

The author (Mathews's Med. Quarterly, April, 1898) collected 25 cases of this condition, 8 of which were cured by operative methods, and 4 by palliative methods. The latter 4 were all acute cases. No chronic case, so far as can be learned, with possibly the exception of Thompson's, has ever been cured by cauterization or stimulation, and surgeons can expect little from this mode of treatment. In the paper referred to, the writer reported 3 cases operated upon by a modified technique, all successfully; since that time he has operated successfully upon 5 others, and assisted in 1, thus making a total of 9 cases. In the case in which he assisted, the operation was not so successful, owing to a mistake of the house-surgeon, which will be detailed later.

The two principles upon which the successful treatment of these fistulas depend are: first, the removal of all obstructions to the passage of urine or intestinal contents through their normal channels; second, the obliteration of the fistulous tract.

So long as a stricture of the urethra remains no hope can be entertained of curing the fistula. For the method of treatment of stricture the reader is referred to the works on genito-urinary surgery, and to a brief article upon this subject by the author (N. Y. Medical Journal, April 13, 1895).

Wherever there is hypertrophy and spasmodic contraction of the sphincter ani, or obstruction to the passage of faecal matter by tumors, strictures, or other conditions of the rectum, it is necessary to remedy these before attempting any direct treatment of the fistula. Forceful dilatation of the sphincter will overcome spasm temporarily, but its results are too transitory to be depended upon in the treatment of so serious a condition. Absolute relaxation for a considerable period is necessary in these cases, and this can only be obtained by incision of the muscle. All obstructions having been removed, the parts should be protected from the abnormal passages of urine into the rectum and of faecal matter and gas into the urethra. Permanent or periodical catheterization will accomplish the first of these. Many ingenious mechanical appliances, such as œsophageal tubes, cannulas with aprons attached, and various methods of packing the anterior rectum and fistulous opening with non-absorbent materials have been devised, but none of them has proved successful in preventing the escape of gas and faeces into the urethra. Allowing the bowels to move only once in four or five days is perhaps the best method to prevent this, unless one wishes to resort to the diversion of the faecal current through an inguinal anus. This last measure has been considered too formidable, and is decried by most

operators and patients. Since it has been demonstrated that the operation is comparatively without danger, and the anus can be safely and permanently closed without opening the peritonæum the second time, it is looked upon more favorably, and would be entirely justifiable in those cases where other methods have failed, or as a preliminary measure to other operations under certain conditions. As will be observed in the paper referred to, this method was utilized by the author in one case on account of extensive rectal ulceration; the result was satisfactory and permanent.

Treatment of the Fistulous Tract Itself.—While the urethral stricture is being dilated or otherwise treated, antiseptic washing and stimulating applications by such substances as nitrate of silver, chloride of zinc, iodine, or even the galvano-cautery, as advised by Sir Henry Thompson and M. Dentu, may be used with the hope of narrowing the fistulous opening, if not of closing it. In acute conditions these methods may succeed, but where the fistulous tract is surrounded by cicatricial tissue, cauterization will be more likely to result in enlarging the orifice, as has been pointed out by Ziembicki. If the stricture is in the deep urethra, all this will be a loss of time, as operation on the fistula involves external urethrotomy of this region, and this will overcome the stricture.

Three principal surgical methods have been advised and attempted in the closure of these fistulas. The first consists in splitting open the perinæum, urethra, and rectum up to and through the fistula, thus forming one channel for the escape of urine and faecal matters. The fistulous tract is then curetted, and the wound left to heal by cicatrization. This operation has been done a number of times, but, so far as can be learned, with only one reported success (N. Y. Med. Chir. Bull., 1831, vol. ii, p. 37).

The second method consists in splitting the recto-urethral septum laterally until the fistulous tract is cut across, thus converting the condition into two fistulas. The posterior rectal fistula is then treated either by incision, by suturing the opening, or by the use of an elastic ligature. The urethral opening is left in this method to heal by granulation, the urine passing out through the perineal incision.

Sir Astley Cooper's method is a modification of this, and consists in splitting the recto-urethral septum between a sound in the urethra and the index finger of the left hand in the rectum for guides. The division is carried well up above the fistulous tract, dividing the latter into two portions. The wound is then packed, and whatever urine escapes through the urethral opening passes out into the dressing or through the perineal incision. White and Martin modify this method by dissecting out and suturing the urethral and rectal openings after splitting the perinæum.

The operation most frequently employed consists in some modification of Sims's operation for vesico-vaginal fistula upon the rectal wall. It is much more difficult, and is less likely to succeed in these cases than in the variety of fistula for which it was devised. It has been attempted many times, but no more than 3 cases have been reported in which it has succeeded. The methods of Wyeth, Kelsey, and Emmett are all modifications of this method and open to the same objections. It has been clearly shown that the passage of healthy urine over a sutured wound does not materially interfere with union. It is necessary to "seek for some other cause, therefore, to explain the numerous failures by the suture method. When the urine collects in a pocket it decomposes, pyogenic bacteria develop, and any healthy processes in the part will soon be checked." The fact that this method of suturing results in a depression or pocket upon the urethral side, thus causing retention of a few drops of urine, easily accounts for its failures. Especially is this true in cases where the fistula is of considerable length and is tortuous, for in such the tract would be only partially obliterated, and the urine infected with whatever bacteria exist in the urethral or bladder cavities would collect in the remaining portion of the tract, infect the wound and prevent union, or result in the formation of a second fistula. The ideal operation for this condition consists in one which will immediately close the fistula without leaving any such pocket or unobliterated fistulous tract and at the same time avoid the dangers of permanent faecal incontinence.

Ziembicki (*Cong. Franc. d. Chir. Proc. Verb.*, 1889, vol. iv, p. 295) has applied a new principle in the treatment of this condition. The operation consists in dissecting out the rectum from all its attachments up to a point somewhat above the fistulous orifice. The edges of the openings in both rectum and urethra are then freshened and sutured; finally, the free end of the rectum is rotated upon its axis until the opening in this organ is brought well off to the side, and thus out of line with the opening in the urethra. The gut is held in this position by sutures introduced around the anal margin. The idea is ingenious, and succeeded in the case reported, notwithstanding a small perineal fistula formed through which urine escaped for a short time. It is a formidable operation, however, and should not be undertaken except by a skilful operator, and in cases in which less extensive dissections have first been attempted. Fuller has reported a successful case done after this method.

The combination of colotomy with suprapubic drainage of the bladder has been employed in these cases, but with no marked success. Even if the method assured a cure of the fistulous tract, it would not be justified until all other methods had failed. The dangers of cystitis and

frequent failure of the suprapubic opening to close after drainage has been continued for a long time contraindicate this procedure under all circumstances. The author's observations up to 1896 had been limited, but from them it appeared that the urethral side of the wound always gave way first in suturing operations, and resulted in the reestablishment of the fistula. Inasmuch as all these methods formed a pocket capable of retaining a few drops of urine at the site of the operation, it seemed that if this could be prevented, and strain on the sutured surfaces

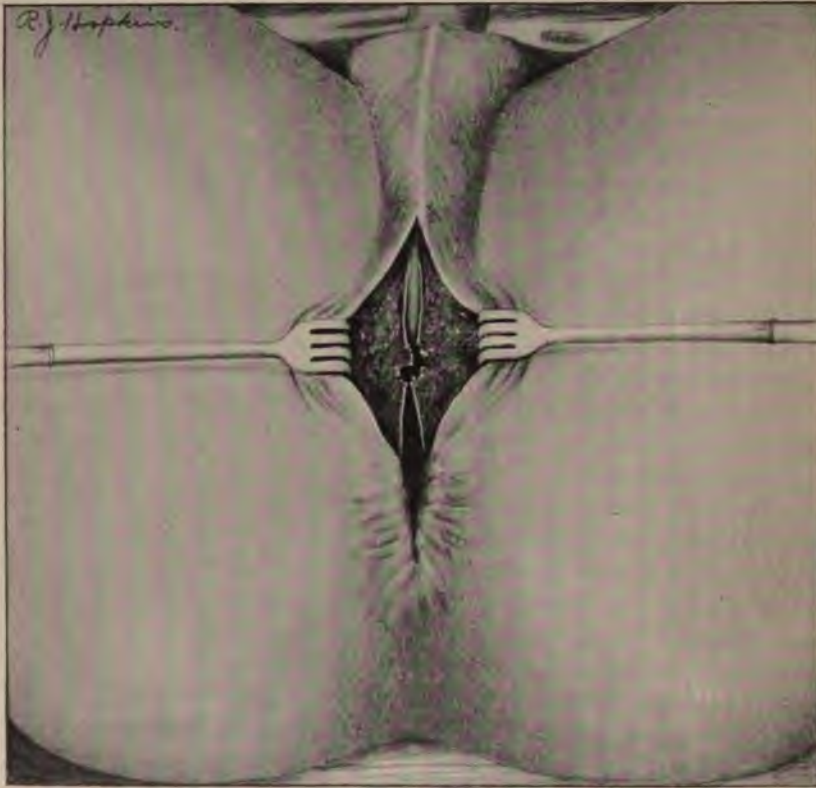


FIG. 157.—RECTUM, PERINEUM, AND URETHRA INCISED TO EXPOSE RECTO-URETHRAL FISTULA.

avoided until union had taken place, the question of curing these fistulas would be solved. The opportunity to test this offered itself in a patient sent to the clinic by Dr. Bodine; the fistula opened into the rectum about $\frac{1}{2}$ an inch above the external sphincter, and was large enough to admit the tip of the index finger. It extended upward into the urethra through a tract about $\frac{3}{8}$ of an inch in length. There was considerable cicatricial deposit about the opening, and a stricture of the membranous urethra anterior to the fistulous opening. The pendulous urethra was normal.

The patient was prepared for treatment by clearing out the intestinal canal, sterilization of the urinary tract through the administration of boric acid and salol, and daily irrigations of the urethra and bladder.

On August 30, 1896, the operation was performed as follows: The rectum was incised in the middle line anteriorly, the cut being carried through into the urethra and extended from the scrotal juncture of the perinaeum into the fistulous opening, thus dividing the urethral stricture (Fig. 157). The cicatricial tissue around the entire fistula was trimmed away with scissors. The intestinal wall was then dissected from its anterior attachments for $\frac{3}{4}$ of an inch above the fistula, and $\frac{1}{2}$ an

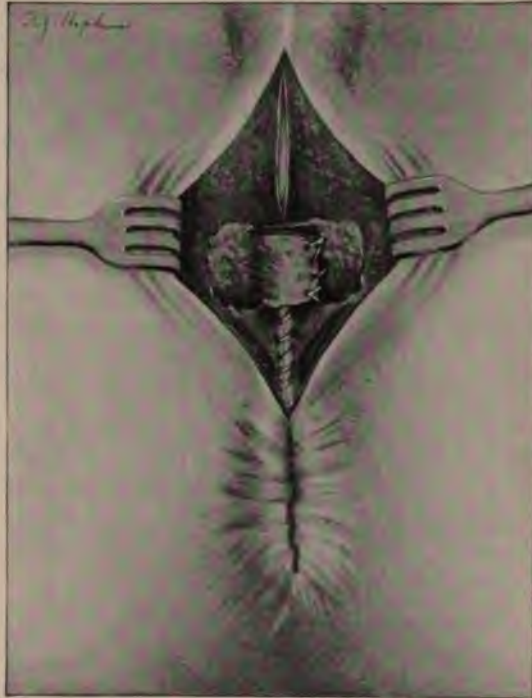


FIG. 158.—RECTO-URETHRAL FISTULA AND WOUND IN THE RECTUM CLOSED.

The incision in the urethra anterior to the fistula is left open. ✓

inch to each side; a flap was then dissected from the soft tissues on either side of the urethra large enough to replace that portion of the floor of this organ which had been destroyed. A steel sound (No. 30 French) was introduced into the bladder, and these flaps sutured together over it at a slight tension. Secondary flaps were taken outside of the first flaps and entirely surrounding them, making a sort of cuff to the first area sutured (Fig. 158). The edges of the rectal wall were sewed together in all their thickness with chromicized catgut down to the external sphincter muscle, at which point the mucous membrane was dissected loose for a short distance to each side, and drawn together by stitches which did not involve the muscle. The incision into the urethra from just below the site of the fistulous opening was left unsutured (Fig. 159). A No. 12 soft-rubber catheter introduced through the meatus into the bladder was fastened there by adhesive straps attached to the head of the penis. The anterior portion of the perineal incision was loosely packed with

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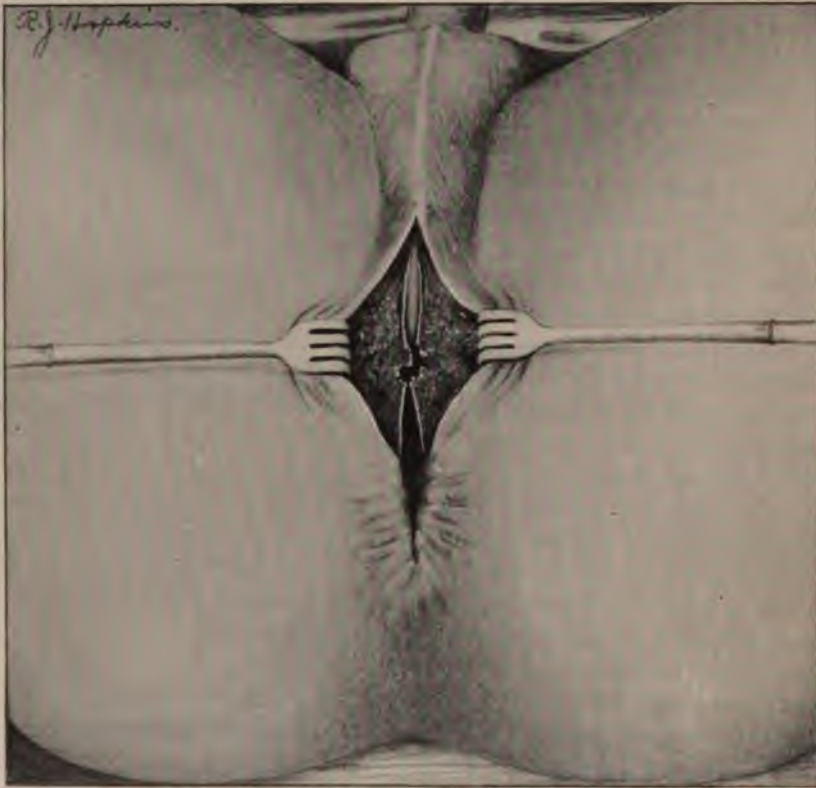


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absorbent gauze, and a large sized drainage-tube introduced into the rectum to facilitate the escape of gas. The catheter seemed to cause the patient no inconvenience, and it was left in position for eighteen

days, the bladder and perineal wound being irrigated daily with Thiersch's solution.

The patient, after serving as an assistant around the hospital for several weeks, was discharged December 1, 1896, perfectly cured. He presented himself for examination in February, 1902, and was still well. The success of the operation is ascribed to leaving no pocket at the site of the fistula, absolutely free drainage for the urine through



FIG. 159.—FINAL STEP IN OPERATION FOR RECTO-URETHRAL FISTULA.

the perinaeum, and the section of the external sphincter muscle which places the parts at rest and at the same time prevents any obstruction to the passage of gas or faecal matter.

In one case in which the author operated, there was so much cicatricial tissue and the opening into the urethra was so extensive, that it was impossible to obtain sufficient flaps of healthy tissue upon the sides to restore the floor of this organ. In that case both ends of the urethra were dissected loose and sutured together (Fig. 160), thus making a practical resection of the urethra. Over this it was possible to drag and suture a very thin fold dissected from the peri-urethral tissues. The success in this case was remarkable from the beginning. There was never a drop of urine passed from the perineal wound so far as the patient was aware. The rectal wound healed by primary union, and the patient left the hospital completely well at the end of six weeks. One year later, however, he returned to the workhouse, having failed to keep up the dilatation of the urethra by the passage of sounds as directed, and was found to be suffering from a stricture at the point of suture in the urethra. By gradual dilatation his symptoms disappeared, and he left the hospital at the end of three months, once more apparently well. This was eighteen months

after the operation, and no return of the recto-urethral fistula had occurred.

Theoretically it is important to retain the catheter in the bladder seven to ten days, and yet in those cases, three in number, in which this was impossible, there were no unfortunate results. If it once slips out there is danger of re-perforating the rectum in attempting to reintroduce it through the meatus. This accident happened in a case operated upon by Percy Bolton after this method. The catheter, instead of entering the bladder, perforated the sutured wound, and extended upward in the rectum for about 4 inches; it was removed at once, and the parts left to heal by granulation. This was a very slow process, and it was not completed at the end of four months when the patient left for home. Subsequently it was reported that the opening into the rectum completely healed, and that the patient only suffered from a slight leakage from the perineal wound at the time of urination. The catheter in such instances should be reintroduced by passing it from the meatus through the perineal wound, and then upward and backward against the superior wall of the urethra through this opening; in this way it can be introduced without impinging upon the sutured wound. In case the patient is unable to bear the irritation of a permanent catheter, the urine should be drawn every three hours by a skilful surgeon with a well-curved silver catheter held close to the superior

wall of the urethra during the first five days. It is important that the bladder should not become distended and urine allowed to leak over into the wound. While the number of cases, 9 in all, is very few, they are sufficient to establish the fact that such cases can be cured.



FIG. 160.—RESECTION OF THE URETHRA FOR RECTO-URETHRAL FISTULA.

Recto-vesical and Entero-vesical Fistulas.—The two conditions indicated by the terms here used differ simply with regard to the portion of the intestinal canal which connects with the bladder. They both consist in an abnormal communication between the intestinal tract and the urinary viscus. They were more or less frequent in times past when it was the practice to puncture the bladder through the rectum in cases of retention of urine. This having become obsolete, fistulas of this variety have largely disappeared. They do, however, occasionally occur as a result of accidents or operations upon the bladder and rectum in the course of malignant disease, and through the process of destructive inflammation.

Instances of wounds connecting the bladder with the rectum are quite numerous, but these very frequently close spontaneously and no fistula results. Thus, in the chapter upon accidents and injuries, reference is made to a number of cases in which bullet wounds and sharp, puncturing instruments, such as bars of iron and paling-sticks, have passed through the rectum and into the bladder, and yet the recto-vesical communications have closed without any surgical interference. Bartels (*Archiv für klin. Chir.*, Berlin, 1878, Bd. xxii, S. 519) collected 78 cases of wounds of the bladder in which only 5 resulted in fistula. It is only after the communication has existed for a certain period that it should be recognized as a fistula.

The Character of the Fistula.—This type of fistula may be direct or indirect. In the first instance it is due to a matting together and direct perforation of the intestinal and vesical walls. In such cases the tract is very short and the openings absolutely opposite each other. The mucous membrane of one organ, as cicatrization occurs, coalesces with that of the other, and a mucous tract between the two cavities is formed. This may occur at the base of the bladder in the neighborhood of the trigone, when the communication will be with the rectum; or higher up in the fundus, when it will be with the sigmoid flexure or small intestine.

The tract may also be indirect, owing to rupture of abscesses into both organs. In such cases the openings will be separated by the abscess cavity. Thus the fistulous tract will be more or less elongated and very irregular in shape. The openings may or may not be opposite each other; in all probability they will be considerably separated. The pathological characters of these fistulas are practically the same as those of ano-rectal fistulas; they may be inflammatory, tubercular, or malignant. While serious in all cases, the degree will, of course, depend upon the pathological cause.

Etiology.—Traumatism or wounds are comparatively frequent causes. Velpeau (*Nouveaux élem. de méd. opér.*, Paris, 1839, t. iv, p. 564) estimated that 20 per cent of them result from recto-vesical wounds. There

are no statistics at the present day to establish or to deny these facts, but inasmuch as all operations upon the bladder through the rectum have been relegated to the surgery of the past, it is probable that the percentage from these causes has been materially reduced. Dittel (Wiener med. Woch., 1881, Bd. xxxi, S. 261, 293, and 321) relates 1 case in which the fistula was produced by violent catheterization.

In one instance of carcinoma of the bladder, the sounding of this organ with a Thompson searcher produced a communication between the two cavities—at least the discharge of urine into the rectum and fæces into the bladder had not been observed until after this examination; but that any surgeon should be violent and careless enough to penetrate a healthy vesico-rectal septum in sounding the bladder is incredible.

In gunshot injuries and puncturing wounds the fistula does not always appear immediately after the injury, but it may follow some days or weeks later, owing to sloughing around the edges of the wound, as is stated by Bartels, or to an extravasation of urine into the septum between the two cavities, and subsequent rupture of the abscess.

Wounds due to foreign bodies in the rectum, as pins, needles, fish-bones, rectal concretions, etc., may result in a perforation of the septum between the two organs, and stone in the bladder has been observed by Herczel (Beiträge zur klin. Chir., Tübingen, 1889, Bd. v, S. 690) to result in a recto-vesical fistula.

Inflammatory conditions both of the bladder and the rectum are accountable for the large majority of such fistulas at the present day. Catarrhal inflammation of the bladder (Mercier, *Gaz. méd.*, 1836, pp. 257, 273; and Ballance, *Lancet*, London, 1883, t. i, pp. 411, 485), dysentery (Herczel, *loc. cit.*), typhoid fever (Woodward, *Med. and Surg. Hist. of War of the Rebellion*), appendicitis, and tubercular ulceration of both bladder and intestine have been known to result in this condition.

Prostatic disease, either suppurative or tubercular, may result in recto-vesical fistula through the formation of an abscess between the tunics of the two organs, which abscess ruptures first into one and then into the other viscus, thus forming the indirect variety of fistula which was mentioned.

Diverticuli in the walls of the bladder or rectum may enclose small calculi or fæcal concretions, which result in inflammation, adhesion between the walls of the two organs, subsequent perforation, and fistula. Malignant disease is one of the several causes of this condition, and may proceed from either organ. This occurs largely in men, owing to the close relationship between the bladder and the rectum; but it is not unknown in women as a result of extensive pelvic and peri-uterine

inflammations; in these the communications occur between the sigmoid flexure or small intestine and the bladder.

The author has seen 2 cases, however, in which the bladder communicated with the rectum through fistulous tracts that passed around the cervix just above the vaginal wall (Fig. 161). One of these patients

was the victim of constitutional syphilis; in the other it was impossible to account for the condition.

In that portion of the intestinal tract in close apposition with the bladder walls, tuberculosis may no doubt result in ulceration, perforation, and the formation of fistula, but it is rarely the cause of such a communication between the bladder and the movable portions of the intestinal canal, as adhesive peritonitis is not a frequent complication of tubercular ulceration of the intestine, and it is absolutely necessary to the formation of an entero-vesical fistula. The recognition



FIG. 161.—RECTO-VESICO-VAGINAL FISTULA.

The fistulous tract indicated by the dotted line passed around the cervix and not through it.

of the pathological causes of this condition is of the utmost importance, as upon it will depend the advisability of radical interference. It is also important to know whether the rectum, the sigmoid flexure, or the small intestine communicates with the bladder, as the prognosis differs in all these cases.

Cripps (*The Passage of Air and Fæces from the Urethra*, London, 1888) has collected 63 cases of entero-vesical fistula in which the intestinal opening was twenty-five times in the rectum, fifteen times in the sigmoid flexure, twelve times in the small intestine, and five times in both the small intestine and colon.

In the 18 cases collected by Quénu and Hartmann, the opening was nine times in the rectum, four times in the sigmoid flexure, twice in the small intestine, twice in the vermiform appendix, and once in the cæcum.

From other sources 8 cases have been collected in which the opening was four times in the rectum, twice in the sigmoid flexure, once in the small intestine, and once in the vermiform appendix.

So there are 89 cases in which the opening was in the rectum in

38, showing that this is the most frequent site. A fact which should be remembered is, that while a stone may exist in the bladder in these cases, it is not necessarily the cause of fistula, but may be the result of the same through some of the faecal contents escaping into the organ and thus forming a nucleus around which the stone forms. Thus, for instance, in the case reported by Kelsey, a stone which was supposed to have caused a fistula proved to be the accumulation of urates about the broken end of a catheter which had been introduced with a view of curing the fistula.

Symptoms and Diagnosis.—The characteristic symptoms of recto-vesical fistula are the presence of urine in the rectum with or without the presence of faecal materials and gas in the bladder. The communication between the two organs may be sufficiently large, or the tract may be in such a direction that urine can escape from the bladder into the rectum and faecal matter can not escape from the rectum into the bladder. The presence of gases in the bladder should not be taken as a pathognomonic evidence of entero-vesical fistula; it is well known that these may develop, owing to certain chemical changes in the urine, and be expelled during the passage of the last few drops of this secretion. Dittel, Hartmann, and Blanquinque have all reported cases of this kind, which may be termed essential gas formation in the bladder. While, therefore, there may be entero-vesical fistulas without gas or faecal matter in the urine they almost never occur without the escape of urine into the rectum. The constant presence of urine in the rectum, however, does not necessitate a persistent dribbling from the anus. A certain number of cases have been observed in which the patients were able to control the urine after it had escaped into the rectum (E. Monod, Dict. encyc. des sci. méd., and P. Blanquinque, Thèse de Paris, 1870, p. 169).

The character of the faecal discharge into the bladder, and subsequently passed out through the urethra, varies according to the digestive functions of the patient and the size of the aperture between the two organs. Small pieces of meat, fibrous portions of vegetables, bone, fat, and fruit seeds have all been found in the bladder and passed through the urethra after much straining and pain. The nature of these materials has been said to throw some light upon the site of the intestinal opening; but this is denied by the best observers, who state that solid substances have been passed when the fistulous opening was in the small intestine as well as when it was in the rectum; and liquid substances are passed in both instances.

The diagnosis, therefore, depends chiefly upon the presence of urine in the rectum; not only must the urine escape into the rectum, but it must be constantly present and not alone at the periods of micturition.

Where the communication exists between the bladder and some portion of the intestine high up, it may be difficult to determine the constant presence of urine in the rectum, inasmuch as the fluid then becomes mixed with the intestinal contents. However, in such cases there will usually be the corroborating evidence of gas and faecal matters in the bladder.

The history of the case will always have some bearing upon the diagnosis, but this is generally meager. Cystitis or proctitis and the passage of lumpy or dark-colored urine may have been observed, but more frequently the symptoms first complained of will be diarrhoea, or rather a constant desire to defecate, which results only in the passage of a small quantity of clear water. Pus and blood may be contained in the discharges, especially if the fistula be the result of a pelvi-rectal abscess. In such cases the history of abscess with its rupture and discharge of pus, either by the urethra or the anus, can be clearly elicited. In tubercular cases the general physiognomy and constitutional condition will indicate the nature of the disease to a certain extent, but not invariably. In malignant disease the history of pain, diarrhoea, frequent micturition, loss of flesh, and general cachexia will corroborate the evidences which may be obtained by the speculum and by digital and cystoscopic examinations.

The differential diagnosis between recto-urethral and recto-vesical fistula will be found in the preceding section.

Having determined the existence of a connection between the bladder and the intestinal tract, the next step in diagnosis is to learn the site of the intestinal opening. If it is low down at the trigone of the bladder, just above the prostate, it may be made out by digital touch; if, however, the opening is small and is ensconced between the folds of mucous membrane, it may sometimes escape notice. Moreover, if it occur more than 4 inches from the anal orifice it will be practically impossible to make a diagnosis in this way. The use of the pneumatic sigmoidoscope is of great assistance in such cases. Not only may openings into the rectum be detected, but also those into the sigmoid flexure—something which was impossible except by uncertain inferences until this instrument was devised.

The cystoscope is of advantage to demonstrate an opening into the bladder, but unfortunately it gives no information as to the point of the intestinal tract with which it communicates. Moreover, if the opening be of any considerable size it will be difficult to distend the bladder sufficiently to operate this instrument properly.

By the aid of a long, flexible probe through the proctoscope, one may determine the course of the fistula, and a view of the parts will indicate the pathological nature to a certain degree. The dangers of

tearing loose the adhesions between the two organs and thus opening the peritoneal cavity, should always be borne in mind when using the probe.

The practice of injecting colored fluids into the bladder, in order to determine if there is a communication between this organ and the rectum, is practically useless as a diagnostic measure. Dumesnil has advised the injection of a very weak solution of perchloride of iron into the bladder while at the same time he introduced a sponge into the rectum soaked in a solution of yellow prussiate of potash (1 to 500); the combination of the two solutions produces a chemical reaction which demonstrated to his mind the existence of a communication between the two organs. This chemical reaction must take place immediately, or it may be assumed that it might occur through osmotic or circulatory channels. Thus, if the fistula is high up in the intestinal tract, the length of time which will elapse before the fluid from the bladder could come in contact with the sponge below would necessarily invalidate the importance of the chemical reaction obtained. The presence of uric-acid crystals in the faecal discharges, and the reaction obtained from this substance, will be better evidence of the existence of urine in the rectum than can be possibly obtained by the injection of colored fluids into either organ.

Prognosis.—The prognosis in these conditions is always grave. While there is a certain number of cases which have resulted in spontaneous cure, the hope of such a termination is most illusory.

The results of surgical interference are scarcely more encouraging. Cripps estimated that the average length of life in this condition is something less than two years, although there is one case reported which lived as long as thirty years after the fistula developed. Blanquinque has summarized the results of operative treatment in 30 cases as follows: Four cured, 5 unimproved; 3 deaths from other diseases; 4 deaths in which particulars were not given, and 15 from urinary infiltration, peritonitis, exhaustion, suppuration and inflammation of the rectum and bladder (Quénu and Hartmann, *op. cit.*, p. 232). In this enumeration of the causes of death, the extension of the inflammatory condition from the bladder upward through the ureter to the kidney seems to have been omitted. The majority of observers refer to this as the most serious complication, and it is probably the most frequent cause of death in these cases. The cystitis and proctitis, while annoying and irritating, are not of such a grave nature as to bring about a fatal termination in themselves. In the majority of instances the rectum becomes tolerant after a time to the presence of urine; and while this does produce a chronic catarrhal inflammation of the organ, it is rarely of serious import. The dangers are therefore upon the side of the

bladder, ureters, and kidneys in cases of direct fistula. In the indirect variety, where there is an abscess cavity between the two openings, the accumulation of urine and faecal matters in this is likely to result in urinary infiltration or burrowing tracts which may perforate the peritonæum, extend down to the buttocks or around the anus, causing fatal peritonitis or eventuating in lardaceous changes of the glandular organs, exhaustion, and death.

Treatment.—In the treatment of this condition it is more important to prevent the escape of faecal matter into the bladder than that of urine into the rectum. Permanent or periodical catheterization and irrigation of the bladder have failed, so far as can be learned, to produce a single cure. In acute conditions due to accidents, injuries, or surgical procedures, permanent catheterization, together with constipation of the bowels, may facilitate the healing. Certain positions, such as laying the patient upon his face or side, so that the secreted urine will gravitate in the opposite direction from the wound, may also be of benefit; but, unless faecal material is kept out of the bladder, these procedures will be of little use. Where a fistula is once established the surgeon is brought face to face with one of two procedures: either a direct closure of the fistulous tract itself or the diversion of the faecal current.

Diversion of the Faecal Current.—Where the opening is in the rectum or lower portion of the sigmoid, a temporary artificial anus may, together with permanent catheterization, result in the closure of the faecal fistula. At any rate, such a diversion of the faecal current will contribute largely to the probabilities of successfully suturing the fistula.

Quénu and Hartmann advise making a permanent artificial anus at once in these cases, but such a radical procedure can not be indorsed. The temporary anus can be made just as effectual to protect the parts, and it can be changed into the permanent form at any time if desirable. Moreover, it can be closed without any particular danger to the patient, provided the fistula heals.

The question of temporary artificial anus, the methods of making it, and its final closure will be found in the chapter on Colostomy. Where the communication between the bladder and the intestine is above the sigmoid flexure, an artificial anus is not likely to prove satisfactory, especially if it must be made in the small intestine. Here one should open the abdomen, separate the two organs, and close the fistulous openings, as will be described later.

After the faecal current has been turned aside, one may attempt to close the recto-vesical opening by freshening the edges and suturing the wound, just as in the operation for vesico-vaginal fistula. If it is high up, the difficulties of approaching it may be overcome by the removal of the coccyx and incision of the posterior wall of the rectum. Some

attempts have been made to close these tracts by suprapubic cystotomy and suture of the wound from the vesical surface. No case, however, has been reported as cured by this method (Thompson; Le Dentu).

It has also been proposed, where the opening is low down, that the anterior wall of the rectum be dissected from the bladder by lateral perineal section to a point above the fistulous tract, thus cutting the latter in two and converting it into a recto-perineal and vesico-perineal fistula. If within reach the openings may be sutured from the perineal wound; if not, this may be packed after having curetted the fistulous openings. Where the fistula results from a pelvi-rectal abscess, unquestionably this would be the proper procedure, because it would furnish complete drainage to the abscess cavity, and any burrowing tracts could be laid open at the same time. The records show that suture of fistula from the rectal surface has proved more successful in these cases than any other procedure. In the statistics of Monod (*Dict. des scs. méd.*, vol. i, p. 437) and Dumesnil (*Revue de chir.*, 1884, p. 24), 26 cases are collected in which artificial ani were made for the cure of recto-vesical fistulas without a single success. Amelioration resulted in some, and in two life was prolonged five and six years. According to Brant, Dumesnil, and Herczel, this operation should be reserved for fistulas due to malignant growths. The author can not go so far as this, but would advise that the temporary artificial anus be employed in these cases as a preliminary to suturing the fistula from the rectal side. The diversion of the faecal current is important for this purpose, but it is not curative.

In suturing the fistula, Czerny's method of employing catgut for the deep row, and silk or silkworm gut in the mucous membrane, appears the most rational. The superficial sutures should be removed at the end of the seventh day.

Where the fistulous opening is in the sigmoid flexure, or connected with some higher portion of the intestinal canal, a more radical operation through abdominal incision will be called for. In such cases it will be necessary to open the abdominal cavity, separate the adhesions between the bladder and the intestine, and then suture the openings separately. Where the adhesion is extensive and the peritoneal covering of the intestine has been destroyed by inflammatory processes, simply suturing the opening is not likely to close it. In such cases it is better to resect the portion of the intestine involved. The wound in the bladder may then be sutured by folding in the walls after the manner of Lembert.

Having accomplished the closure of the openings, a gauze wick, surrounded by protective tissue, should be passed down to the opening in the bladder and left there for several days. Where the intestinal opening has been sutured without resection, a second wick should be carried down and held in apposition with this suture, but the space between the two

openings should be widened by a Mikulicz drain in order that the leakage from one cavity shall not affect the other. Terrier has adopted this method without suturing either opening, but simply placing a drain between the bladder and intestine; in his case the cure of the vesical opening appeared to be immediate, and the fæcal fistula which resulted healed in a short time. Skene has also used this method with success in one case (personal communication), but the combination of suturing and draining afterward would appear to promise the best results.

Recto-ureteral Fistula.—A certain number of cases of ureteral fistula have been reported, but none in which the opening was into the rectum itself, except in malformations which have been already described in the chapter upon that subject. Kelly, Kuster, Tuffier, Morestin, and others have attempted the transplantation of ureters into the rectum in cases of extirpation of the bladder for malignant disease. These cases, however, have been experimental, and have no practical bearing upon recto-ureteral fistula. In one case reported by Bayard a communication between the ureter and the duodenum was found.

Simon has attempted the total extirpation of the bladder for carcinoma, and planting the ureters in the rectum. His patient, however, died of peritonitis. The author has seen one case in which a recto-vagino-ureteral fistula resulted from an operation for the extirpation of a carcinomatous uterus, and, strange as it may appear, the fistula closed spontaneously.

Recto-genital Fistula.—The term recto-genital is applied to all those abnormal openings occurring between the rectum and the genital organs, as distinguished from the urinary. They are practically confined to the female sex, and should not embrace those communications due to malformations. A perineal fistula, extending forward and into the scrotum, may be termed a recto-genital fistula, but as it has no peculiar characteristics differing from the ordinary subtegumentary fistula, it need not be discussed in this connection. A prostatic abscess, or an abscess that occurs as a result of suppuration in Cowper's glands, may break through into the rectum without communicating with the urinary tracts; in such cases they form blind internal fistulas, which have been described. As a rule, both of these types either communicate with the urinary tracts in the beginning or later in their course. The recto-genital fistulas may then be described as recto-uterine, recto-vulvar, and recto-vaginal.

Recto-uterine fistulas are exceedingly rare, if, indeed, they exist at all except as congenital malformations. Petit (*Annales de gynécologie*, Paris, 1882, t. ii, p. 401, and 1883, t. i, pp. 14, 90, 290, 353, 431) has thoroughly reviewed the subject of entero-uterine fistulas. No case was noted in which the rectum was involved. The writer has seen one case in which a carcinoma uteri involved the posterior uterine wall, extended

to the rectum and produced a communication between the two organs through which a uterine sound could be passed; this was in an old woman in the Almshouse Hospital, in whom curettage of the carcinomatous growth had been practised some months previously. Whether the neoplasm produced the fistula, or whether the opening was made by the curettage, it is impossible to say.

It is possible that a pelvi-rectal abscess originating in the peri-uterine structure might eventually break through into both organs; but the uterine tissue being so tough and resisting, it is hardly reasonable to suppose that the burrowing would extend through it when so many lines of less resistance exist about it. Musilier (Bull. de la soc. anat., Paris, 1874, p. 848) has reported a case of a woman who died from albuminuria, in whom the necropsy revealed a communication between the pus sac in a uterine fibroid and the rectum. There does not appear to have been any communication between the uterine and rectal cavities. In the case reported by Lauers and Bidder (Revue de chir., Paris, 1885, p. 1013, and Annales de gynéc., Paris, 1892, t. ii, p. 118) a true fistula between the sigmoid flexure and the cavity of the uterus has been established. Quénu and Hartmann report a similar case (*op. cit.*, 214) which healed spontaneously, and the authors were not able to state what portion of the intestine it was which communicated with the uterus, though it was above the rectum.

From these observations one gains no practical information. The fistula is a possibility, but is so exceedingly rare that operative intervention to cure it has never been undertaken. In the one definite case which the writer saw the malignant neoplasm was inoperable, although the patient lived some four months after the fistula appeared.

Recto-vulvar Fistula.—Fistulas opening in the genital tract anterior to the hymen are termed recto-vulvar. They occur ordinarily as a result of injury, infection, inflammation, and suppuration of the glands of the labia and vagina anterior to the fourchette. They may be due to injuries during labor and efforts at repair of the perinæum. Spencer Wells (Med. Times and Gaz., 1860, p. 61) and Barton Hirst (Am. Journal of Obstetrics, 1886, p. 83) have reported cases due to violent coitus. Kelsey (*op. cit.*, p. 135) reports a very interesting case of this kind in which there were two openings in the vulva and two in the rectum. This case, however, originated from suppuration in the labial glands upon each side.

Symptoms.—The disease ordinarily begins as a pimple or slight inflammation in the labia of one side. It sometimes occurs simultaneously on both sides. If this is not opened promptly and drained, it may burrow backward to one side of the perineal raphe and open into the anus. It may also burrow into the ischio-rectal fossa after it passes the

transversus perinei muscles, but such is very rarely the case. The tracts usually run directly backward beneath the superficial perineal fascia, and open either into the anus or about its margin in the anterior quadrant of the same side upon which the labial abscess occurs.

The openings may be single or multiple. The writer has seen a case in which there were four openings about the anus and one just within the vulva. The patient will give the history of pain, especially upon walking, a swelling about the genital organs, sometimes difficulty in micturition, and always, if the fistula is incomplete, of a sudden relief from these pains following a discharge of pus.

The opening is nearly always found in one labia or the other, or just within the vulva in front of the hymen.

Treatment.—The treatment of these cases should not be carelessly undertaken. Great care should be observed to preserve the perineal body. Open incisions, such as those practised upon simple ano-rectal fistulas, may result in disastrous consequences through the destruction of the female perinæum. Taylor advised passing a probe into the fistulous tract from the vulvar orifice and cutting down upon it at a point near the anal margin, thus converting the condition into ano-rectal and vulvo-perineal fistulas. The rectal portion of the tract he treated by the ligature, and the anterior portion by stimulating applications.

In the light of modern experience with excision and immediate suture of fistula, it appears best that such uncomplicated tracts should always be dissected out and the wounds immediately closed. Where there are two distinct fistulous tracts which communicate with each other in the rectum, as in the case described by Kelsey, the ingenuity of the operator will be exercised as to what course to pursue. It seems that in such cases one might with safety excise and suture the two perineal tracts at different sittings, or if there be only a slight dissection of the tissues, they might both be done at one time.

The question as to the pathological nature of these fistulas and its influence upon the operation differs in no wise from that in general ano-rectal fistula. If the process be tubercular, the fistula should be entirely excised and the edges sutured together; or else it may be treated by antiseptic irrigation and the application of methylene blue, carbolic acid, and iodine, or with pure carbolic acid alone.

Occasionally these fistulas have only one opening, and that in the rectum, thus forming blind internal fistulas. In such cases the fistula should be converted into a complete one, and if it fails to close after injections of nitrate of silver it should then be excised. In suturing a wound made after excising these fistulas, it is very important that accurate apposition of the muscular tissues should be made. In order to accomplish this one should in cutting down upon the fistulous tract

isolate the ends of the muscle when cut, grasp them with fixation forceps, and hold them to one side while the fistula is dissected out. After the deeper portion of the tract has been closed then these ends should be accurately brought together, and no time will be lost in searching for them.

Recto-vaginal Fistula.—This is perhaps the most frequent of all complicated fistulas. It consists in an abnormal opening between the rectum and the vagina proper, or that part of the female genital tract posterior to the hymen or its remains. It may be direct or indirect, depending largely upon its cause and the size of the openings. It results from a variety of causes, the comparative frequency of which it is impossible to estimate. Kelsey states that it is nearly always due to the imperfect repair of the perinaeum after rupture during childbirth. Mundé (Boston Med. Journal, 1885) has reported a case resulting from brutal coitus. It is frequently the result of an incomplete tear of the perinaeum, such as may be described as a submucous rupture of the recto-vaginal septum. Sloughing of this septum, owing to prolonged pressure by the foetal head, is also a cause. The communication does not take place until several days after labor, just as in the case of vesico-vaginal fistula.

Syphilitic ulceration, with or without stricture, is a frequent cause of this type of fistula. In one year the author observed 6 cases of this condition in 4 of which there was stricture of the rectum; all of the patients were syphilitic, and the ulcerations bore the indubitable evidence of the disease. It has also been observed in cases of simple cicatricial stricture of the rectum.

Tubercular ulceration of the rectum may result in a fistula of this type, but certainly it is a very rare cause. Carcinoma of the rectum or vagina frequently results in a communication between the two cavities. Sloughing of the septum, due to an operation for hæmorrhoids, has been mentioned by Quénu and Hartmann as a cause, and one can easily see how too large a bite with a hæmorrhoidal forceps or with the ligature may result in this condition. Prolonged pressure upon the recto-vaginal septum from any cause may result in sloughing and the formation of recto-vaginal fistulas. The writer has removed a glass pessary from the rectum which had ulcerated through the septum and left a large opening between the two cavities into which three fingers could be easily introduced.

Fistulas of this type may also result from abscess developing in the septum, from tumors of the perinaeum, dermoid cysts, or from foreign bodies in the intestinal canal, such as pins, fish-bones, etc., which penetrate the septum, especially in cases of anterior rectocele.

Large pelvi-rectal abscesses developing in women may burrow down

between the layers of this sæptum and open both into the rectum and into the vagina, thus constituting a recto-vaginal fistula. The fistulous tract in these cases may not be direct, but open at one level into the vagina, and at another into the rectum with an irregular abscess cavity intervening.

Symptoms.—Except in those cases resulting from abscesses, ulcerations, and neoplasms, few subjective symptoms will precede the formation of the fistula. The history of traumatism or accidents in childbirth, the prolonged retention of the head in the hollow of the sacrum, rupture of the perinæum and efforts at its repair, will all point to the cause of the fistula.

The diagnosis is very simple. The escape of gas and fæces through the vagina at the time of defecation, or involuntarily, leave no doubt in the patient's mind as to an abnormal communication. The presence of fæcal material in the vagina, the vaginitis and leucorrhœa resulting therefrom, are the distressing features of these cases. They not only cause pain and irritation, but mortification and uneasiness to the individual, resulting sometimes in melancholia and even in suicide.

The opening can generally be seen in the vagina with the aid of a Sims's speculum introduced into the anterior commissure. It may also be felt with the finger in the rectum, or seen through the ordinary fenestrated speculum. Ordinarily the opening is large enough to admit the end of the finger, and frequently much larger. It is generally in the median line and within the first 2 inches above the anus. The tract is ordinarily short and direct. It may, however, be diagonal and somewhat elongated when it occurs from puncture, abscesses, or neoplasms in the recto-vaginal sæptum. In the beginning of the condition there is ordinarily a discharge of pus, and sometimes blood with the fæcal passages or from the vagina. After a period, however, the pus ceases to discharge, and the condition occasions the patient no pain except that due to the vaginitis. In this state the tract will be found lined throughout with mucous membrane, and it will be impossible to decide where that of the rectum ends and that of the vagina begins, the epithelial surfaces gradually blending at an indeterminable point.

In cases where the tract is oblique the openings upon both surfaces are flap-like, and it may be difficult to find them. If, however, the patient frequently passes gas from the vagina, the diagnosis may be considered established and the search should not be given up. Where there is a stricture of the rectum the fistulous communication will almost always be found below it.

Treatment.—The treatment of this condition has not been invariably successful, and it is no unusual thing to see patients who have undergone three, four, and even more operations for the closure of these

fistulas, and all in vain. A very small proportion of them may be closed by cauterization and local treatment of the fistulous tract, but in the large majority this will fail. The instruments and tampons devised for carrying the faecal current past the fistulous opening have not been successful. Prolonged constipation of the bowels after cauterization of the fistulous tract is more likely to be successful than any of these appliances.

As a rule, however, some surgical procedure will be necessary, and of these there is a large variety. They may be divided into three types: operations upon the fistulous opening through the rectum, operations upon the fistulous opening through the vagina, and complete excision of the fistulous tract combined with perinæorrhaphy.

Operations through the Rectum.—Inasmuch as the faecal and gaseous passages which are supposed to keep these fistulas open proceed from the rectum, it would appear more rational to close the fistulous opening upon this side and thus obviate the escape of these substances into the tract. If this could be successfully done, in all probability the rest of the fistulous tract between it and the vagina would heal spontaneously. The difficulties in this operation consist in the impossibility of absolute asepsis, the constant mobility of the rectal wall on account of peristaltic contractions, and, finally, the difficulty in reaching the opening through the anus. Prolonged preparation combined with intestinal antiseptics and frequent douches will do much to overcome the first. Opium in large doses will practically control the second, but the difficulties of approach, when the fistulous opening is high up in the rectal cavity, are not so easily overcome. Terrier and Hartmann (*Annales de gynéc.*, Paris, 1891, vol. ii, p. 192), Heydenreich (*ibid.*, 1894, t. ii, p. 341), and Demarquay have attempted to accomplish this by splitting the anus and rectum posteriorly and removing the coccyx, or by doing a practical Kraske operation. The seriousness of such operations is out of all proportion to the gravity of the condition. If the opening can be reached and sutured by an incision through the posterior commissure of the anus no permanent ill effects will be likely to follow this. Upon the whole, however, one must admit that the results of plastic operation upon the rectal end of these fistulas do not justify either of these procedures. Occasionally, when the opening is small and low down, one may freshen the rectal opening and close it successfully by sutures; but where the opening is large and some distance above the anus, operations through the vagina or through the perinæum are more likely to be successful.

Operations upon the Vaginal Wall.—The simplest of these is that advised by Lauenstein (Fig. 162), which consists in denuding the fistulous tract down to the rectal mucous membrane from the vaginal surfaces. Stitches are then introduced from the vaginal side embracing all the

tissue of the recto-vaginal septum except the mucous membrane of the rectum, and the wound is thus closed. The sutures should be of silver wire, and introduced in whatever direction will bring the parts together



FIG. 162.—LAUENSTEIN'S OPERATION FOR RECTO-VAGINAL FISTULA.

most accurately and with the least tension. No effort is made to close the opening in the rectal mucous membrane. It is wise, however, after having sutured the fistula, to stretch the sphincter, introduce a rectal tube, and constipate the patient in order that no fluid faecal matter shall infect the wound, and that there shall be a free escape of the intestinal gases through the anus. Fergusson dissects up a cuff of mucous membrane upon the vaginal side about $\frac{1}{2}$ an inch outside of and surrounding the fistulous opening. This cuff is dissected inward toward the fistula, but left attached around the margin of the opening; it is then caught to-

gether in the center and invaginated through the fistulous tract into the rectum, where it is grasped by a hæmorrhoidal or narrow-bladed clamp, and held in this position while the freshened surfaces around the fistula in the vagina are brought together with silver or silkworm-gut sutures. The inverted flap closes the opening into the rectum for the time being, and prevents the escape of gas and faecal material into the fistula until the freshened surfaces have had an opportunity to unite. The same precautions should be exercised here as advised above with regard to stretching the sphincter, constipating the patient, and introducing a tube.

Various modifications of the flap operation have been devised. They all consist in attempts to close the fistula by sliding or transplanting flaps from the vaginal wall over the fistulous opening. In some the tract itself is dissected out and sutured, in others no attention is paid to the tract, and it is attempted to close the fistula by placing a patch of one or two layers of vaginal mucous membrane over the anterior aperture. Among these operations may be mentioned those of Montgomery (*Gynæcology*, p. 224), Saenger (*Transactions of the Amer. Ass'n of Obstet. and Gynæcol.*, 1890, p. 359), Schauta (*Centralblatt f. Gynäkol.*, Leipzig, 1886, S. 485), Fritsch (*Centralblatt f. Gynäkol.*, Leipzig, 1888, S. 804), and Le Dentu (*Annales de gynécol.*, 1890, p. 336). They are all ingenious, but more or less complicated. The simple methods of Lauen-

stein and Fergusson will accomplish all that can be done by these complicated procedures. Where these plastic operations have failed, or where the fistula is associated with ruptured perinæum, some operation designed for its closure and the repair of the rupture at the same time should be employed.

Complete Excision of the Fistulous Tract combined with Perinæorrhaphy.—The technique employed by the author in this operation is as follows:

The sphincter muscle should be thoroughly but gently stretched; the perinæum is then completely incised from the vagina into the rectum up to, but not including the fistula; a probe is then passed through



FIG. 163.—CLOSURE OF RECTO-VAGINAL FISTULA, SHOWING MUCOUS FLAP BROUGHT OUTSIDE OF RECTUM AND SUTURED TO THE SKIN.

the fistula, and the latter, together with all its cicatricial tissue, is dissected out *en masse*. The mucous membrane of the rectum is trimmed off from the edges of the wound for about $\frac{1}{2}$ an inch up to the level of the fistulous opening, and above this it is loosened from its attachments until it can be brought down to the margin of the anus; the perineal septum is then brought together down to and including the sphincter muscle with a continuous chromicized catgut suture. Three or four deep silver-wire sutures are then passed through the perinæum, after the manner of Emmet. Before the latter are fastened, the mu-

cous flap in the rectum is brought down and sutured to the skin at the margin of the anus (Fig. 163); the wire sutures are then drawn together and made fast by twisting or by perforated shot, and finally the edges of the mucous membrane in the vagina are sutured with plain catgut and sealed over with iodoformized collodion. The operation consists in doing practically a Whitehead operation upon the anterior wall of the rectum combined with a complete perinæorrhaphy. The mucous flap closes all communication between the rectum and the perineal wound, and thus protects the latter from fecal and gaseous passages. A small drainage-tube is placed in the rectum to facilitate the escape of gases, and the patient's bowels are constipated for six or seven days. After this period injections of oil and glycerin may be given to soften the fecal materials, but under no circumstances except real danger to the life of the patient should a purgative be given until the hard fecal accumulations have been removed or softened. The wire sutures are removed on the eighth day. In 7 cases done by this method not a single failure has occurred. In one instance, in which complete laceration of the perinæum and efforts at repair had resulted in great destruction of tissue, it was impossible to bring the parts accurately together without great constriction of the anus; this difficulty was overcome by incising the rectum in a V-shape posteriorly (Fig. 108), thus relaxing the sphincter muscles and allowing the parts to be brought into more perfect apposition. No incontinence followed this operation, and from being one of the most despondent and miserable of women, this patient was enabled to enjoy society and travel without any fear of involuntary discharges and the personal mortification consequent thereto.

In a certain number of cases the extensive destruction of tissue renders it impossible to restore the rectal wall without causing a stricture. In a patient from whom a glass pessary was removed through the anus, inasmuch as she had passed the menopause, it was considered wise to freshen the anterior lip of the cervix and suture this to the freshened surfaces of the lower margin of the fistula, thus turning the mouth of the uterus into the rectum. By this means the opening was effectually closed. Simon has advised closing apertures of this kind by a flap taken from the posterior lip of the cervix. The advice of Rose and Czerny to precede this operation by inguinal colotomy, with the hope that the recto-vaginal fistula will close spontaneously, is illusory and apparently unjustifiable.

Episeioclisis has been advised by Kaltenbach (Centralblatt f. Gynäk., 1883, No. 48) in these cases, but it has never met with great favor in this country. One of the plastic methods, or the modified perinæorrhaphy described above, will generally give the most satisfactory results.

CHAPTER XIII

STRICTURE OF THE RECTUM

STRICTURES of the rectum are spoken of as *annular*, *valvular*, *tubular*, and *linear*, according to the shape which they take. The annular stricture is one which assumes the shape of a ring, involving only a very small extent of the rectum, but completely surrounding it. The valvular stricture was formerly understood to mean that condition in which a fold of mucous or fibrous tissue extended partially across the lower end of the rectum or upper portion of the anus. This condition is congenital, and has been described in the chapter on Malformations. The term has been applied of late to cases in which there was inflammation, thickening and tension at the margin of the valves of Houston; these, strictly speaking, are obstructions and not strictures. The tubular stricture, sometimes called "cannular," consists in a tube-like contraction of the rectum that extends for 1 inch or more in its length, in which the entire circumference and all the tunics take part. The linear stricture consists in a cicatricial or fibrous deposit over a limited area in the circumference of the intestine by which the caliber of the latter is lessened either through the dimensions of the deposit itself or through the contraction of the walls of the gut over the area which it occupies.

Strictures are spoken of as of large and small caliber according to the amount of coarctation which they produce. We also read of congenital and acquired stricture, simple, cicatricial, spasmodic, soft, hard, malignant, and benign strictures. The last term is a misnomer, for as Cripps (*op. cit.*, p. 215) has well said, every stricture if left alone eventually results fatally, if not from the disease itself, at least from the symptoms which follow in its wake and shorten life. According to their supposed etiology strictures are divided into *congenital*, *neoplastic*, *traumatic*, *tubercular*, *syphilitic*, *gonorrhœal*, *dysenteric*, and *inflammatory*. All except the first two are included in the general term *inflammatory stricture*, and we therefore adopt the following divisions:

Congenital Strictures, Neoplastic Strictures, Spasmodic Strictures, Inflammatory Strictures.

The shape of the stricture may modify to a certain extent the surgical procedures applicable to its management, but it has little if anything to do with the pathological nature of the disease. Before discussing these types, reference must be made to strictures which do not constrict, or at least do so in a very slight degree.

Stricture of Large Caliber.—Every surgeon is familiar with the period when it was the custom to introduce an ordinary steel sound of very moderate size into the urethra, and if it passed backward without absolute obstruction, pronounce the patient free from stricture. Later on, cases arose with symptoms referable to the urethra, and yet in which the ordinary methods of examination failed to show any condition to account for them. The invention of the bulbous bougie, and after this the urethrometer, established the fact that aside from the normal coarctations of the urethra there frequently occurred from pathological conditions slight contractions in caliber that gave rise to certain neuralgic and reflex symptoms which before this time were little understood and not at all amenable to treatment. The discovery of this condition led to new and revised methods of treatment, and the consequent cure of many cases which had hitherto baffled the efforts of surgery. The same conditions exist in the rectum. Small cicatricial or connective-tissue deposits in the walls of such canals as the urethra and rectum are constant sources of irritation because of the friction produced by the passage of fecal matter and urine over them. It is not necessary that the caliber of the canal shall be so contracted as to produce an absolute obstruction in order to produce irritative symptoms. As an evidence of this the following cases are cited:

Mrs. L. was operated for a small post-rectal fibroid on October 15, 1894, and the operation was followed by some ulceration at the point from which the tumor was removed; but this healed, and the patient seemed to recover entirely within due time. She sought advice five years later, describing herself as suffering from a frequent desire to defecate, a slight discharge of mucus which stained her linen, and constant aching pain in the back and pelvis. A careful examination showed the existence of the cicatrix at the left posterior quadrant of the rectum, but it was not painful; and as it was possible to introduce a No. 10 Wales bougie, it did not seem probable that the cicatrix was the cause of her suffering. A slight hypertrophic catarrh existed, and she was also nearing the menopause with a sub-involuted uterus. The treatment included rectal lavage, the regulation of the diet, and occasional administration of such sedative and antineuralgic remedies as her family physician had found to relieve her, in the hope that by tiding her over the climacteric she would be relieved of her pains. Two years later the woman consulted the author again, this time in desperation; formerly she had positively refused to consider any operation, but at this time her first remark upon entering my office was, "I am here to do anything you say to get relief." Her neuralgia had continued during the two years since she had been seen. An examination of the rectum elicited the fact that the fibrous deposit had extended farther around the

rectum, involving about one-third of the circumference; the mucous membrane over it was slightly redder than normal, but the caliber of the gut was very little reduced. On September 19, 1900, this tissue was excised and the mucous membrane was sutured over the wound. From the day of the operation this patient's neuralgia absolutely ceased, the pains in her hips and legs disappeared, and she wrote three months later that she was perfectly well.

In another case of this nature in which there was no history of an operation, but of a "dysentery," as she called it, about fourteen years previously, the patient complained of an inclination to go to the closet frequently, a feeling of pain and dragging when her bowels moved, and an aching in the back and pelvis for some time after stool. Examination of the rectum with the finger showed no abnormalities below, but about $8\frac{1}{2}$ inches above the anus a narrow, submucous band surrounding the lateral and anterior two-thirds of the rectum could be felt. It was not a normal narrowing, but a distinct band surrounding the rectum, and by pressure upon it it was possible to produce the same pains of which the woman complained when she had well-formed fecal passages. There was no cicatrization or evidence of preceding ulcerations in the mucous membrane of the rectum, and so far as could be made out by palpation there was no great thickening of the tissues; full-sized bougies passed without difficulty, but did not give much relief. The hand passed into the rectum felt this annular contraction, about the caliber of a good-sized shoestring, entirely surrounding the intestine. By gradually insinuating the palm of the hand through this portion and folding the fingers so as to increase the circumference, the band gave way and the normal caliber of the rectum was immediately restored. The patient was watched carefully for the next two days, but, so far from having any alarming symptoms, she had immediate relief from the constant desire to defecate; and when on the second day following the operation her bowels moved, she was delighted to find that it was without straining, and accompanied with no pain whatever.

Some readers will attribute the result in both of these cases to the divulsion of the sphincter, but in neither was there any unusual contraction or spasm of this muscle, and more than that, both cases had been treated by gradual and forcible dilatation of the sphincter before they were finally operated on. Three other cases of this nature have been seen at the clinic, in all of which the symptoms appeared to be due to the irritation of the fibrous deposit and not to any marked narrowing of the gut.

The cases presented are too few to base conclusions upon, but they are suggestive at least of a possible obscure cause of many rectal symptoms which the ordinary treatment fails to relieve.

Obstructions to fecal passages from pressure by pelvic organs, tumors, pessaries, etc., outside of the rectal wall, can not properly be called strictures of the rectum, but they produce similar symptoms and may excite an inflammation in its walls which will eventually produce them.

CONGENITAL STRICTURES

The subject of congenital strictures has been already considered in the chapter upon Malformations. At the risk of repetition, however, we may say here that this condition is frequently unobserved until later on in life, when, on account of change in food and habits, the patient's stools become more solid, and difficulty in the passages begins to be felt. Patients assume that this condition is simple constipation, and pay little attention to it until the necessary straining produces fissure, hæmorrhoids, or other inflammations of the rectum or anus. This usually occurs about the age of puberty. Under these circumstances they consult the doctor, and upon finding a strictured condition about the margin of the anus, or just below the level of the internal sphincter, he is very liable to be misled in regard to the nature and etiology of the same. A very careful examination into the history of such patients will be necessary to establish the true state of affairs. It is not to be supposed that a patient will develop a cicatricial or fibrous stricture without the history of some inflammatory or ulcerative condition having preceded it. These cases can give no history of any rectal condition beyond that of gradually increasing constipation. Many of them will be able to recall the fact that constipation had existed from early infancy, that it was better for a period during childhood, began again at the age of twelve or fifteen, and after this time it gradually grew worse. The use of enemata and laxatives will have become an established habit with such individuals in early life. Ordinarily there will be no evidence of loss of tissue, but rather an abnormal development. The stricture in such cases is usually about $\frac{1}{4}$ to $\frac{3}{4}$ of an inch above the margin of the anus. It may consist in one well-defined band, or sometimes a circular fold with an opening in the center or on the side. The sphincter muscle may or may not be hypertrophied, but it is absolutely distinct from the fibrous band which forms the stricture.

When these strictures are seen after the age of puberty, they are generally quite dense and difficult to dilate; in a young woman twenty-three years of age it was impossible even by the exercise of considerable strength to dilate the parts sufficiently to introduce a good-sized Sims's speculum, and in order to accomplish this it was necessary to cut the stricture. The fibrous tissue was removed by dissection, and was more than $\frac{1}{4}$ of an inch in thickness, dense, hard, and almost cartilaginous. After having removed it, the mucous membrane of the rectum was dissected up and sutured to the margin of the skin just over the external sphincter. The patient made an excellent recovery, and all her symptoms were relieved. Ordinarily, however, such stricture will not be found so dense, and gradual dilatation with small incisions at several

rectum, involving about one-third of the circumference; the mucous membrane over it was slightly redder than normal, but the caliber of the gut was very little reduced. On September 19, 1900, this tissue was excised and the mucous membrane was sutured over the wound. From the day of the operation this patient's neuralgia absolutely ceased, the pains in her hips and legs disappeared, and she wrote three months later that she was perfectly well.

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Obstructions to fecal passages from pressure by pelvic organs, tumors, pessaries, etc., outside of the rectal wall, can not properly be called strictures of the rectum, but they produce similar symptoms and may excite an inflammation in its walls which will eventually produce them.

CONGENITAL STRICTURES

The subject of congenital strictures has been already considered in the chapter upon Malformations. At the risk of repetition, however, we may say here that this condition is frequently unobserved until later on in life, when, on account of change in food and habits, the patient's stools become more solid, and difficulty in the passages begins to be felt. Patients assume that this condition is simple constipation, and pay little attention to it until the necessary straining produces fissure, hemorrhoids, or other inflammations of the rectum or anus. This usually occurs about the age of puberty. Under these circumstances they consult the doctor, and upon finding a strictured condition about the margin of the anus, or just below the level of the internal sphincter, he is very liable to be misled in regard to the nature and etiology of the same. A very careful examination into the history of such patients will be necessary to establish the true state of affairs. It is not to be supposed that a patient will develop a cicatricial or fibrous stricture without the history of some inflammatory or ulcerative condition having preceded it. These cases can give no history of any rectal condition beyond that of gradually increasing constipation. Many of them will be able to recall the fact that constipation had existed from early infancy, that it was better for a period during childhood, began again at the age of twelve or fifteen, and after this time it gradually grew worse. The use of enemata and laxatives will have become an established habit with such individuals in early life. Ordinarily there will be no evidence of loss of tissue, but rather an abnormal development. The stricture in such cases is usually about $\frac{1}{2}$ to $\frac{3}{4}$ of an inch above the margin of the anus. It may consist in one well-defined band, or sometimes a circular fold with an opening in the center or on the side. The sphincter muscle may or may not be hypertrophied, but it is absolutely distinct from the fibrous band which forms the stricture.

When these strictures are seen after the age of puberty, they are generally quite dense and difficult to dilate; in a young woman twenty-three years of age it was impossible even by the exercise of considerable strength to dilate the parts sufficiently to introduce a good-sized Sims's speculum, and in order to accomplish this it was necessary to cut the stricture. The fibrous tissue was removed by dissection, and was more than $\frac{1}{4}$ of an inch in thickness, dense, hard, and almost cartilaginous. After having removed it, the mucous membrane of the rectum was dissected up and sutured to the margin of the skin just over the external sphincter. The patient made an excellent recovery, and all her symptoms were relieved. Ordinarily, however, such stricture will not be found so dense, and gradual dilatation with small incisions at several

points in the circumference will accomplish a cure in these conditions. It is unnecessary to repeat what has been said upon this subject in the chapter on Malformations, but this will serve to call the reader's attention to the possible congenital nature of the strictures found low down in the rectum.

NEOPLASTIC STRICTURE

The rectum may be obstructed by a new growth inside of it or within its walls. Unless such a growth forms a true constriction of the rectal caliber it can not properly be called a stricture; a polypus may completely fill up the rectal cavity, and yet it does not comprise in any way a stricture; the same may be said of fibroids, of papillomata, and of condylomata, they are obstructions but not strictures. Such growths will therefore be considered in the chapters on Neoplasms of the Rectum. Malignant growths, such as sarcomata and carcinomata, not only obstruct the rectal caliber by protrusion into it, but they also narrow it by a fibrous contraction of the walls of the gut. Especially is this true of carcinomata; they form a type of stricture which is both obstructive and contracting. The fibrous portion of the stricture in these cases may have none of the elements of the neoplasm in it, and is probably of an inflammatory nature; but it is of small importance compared with the neoplasm that causes it. When malignant growths have once been established, total extirpation offers the only ground of hope for the patient, and the stricture is always included in this. These strictures will therefore be considered in the chapter on Malignant Neoplasms of the Rectum. The present chapter is limited to the consideration of that general type of stricture produced by some form of inflammation. The cause and extent of the inflammation, the amount of tissue destruction, and the method of healing will determine the type of stricture.

Before beginning to discuss the special varieties of inflammatory stricture, it will be well to take a hasty review of the anatomical construction of the intestinal walls. It will be remembered that the rectal wall is composed of four separate layers: the mucous, the submucous, the circular, and longitudinal coats; and in addition to these, in its upper portion and throughout the pelvic colon, it is surrounded by the peritonæum. There jut out into the cavity certain folds of mucous membrane between the layers of which are included connective-tissue fibers with glandular and cellular substances between them. These protrusions, called Houston's folds or valves, are fairly constant in certain locations which are indicated by sulci upon the external surface of the gut, and give it a convoluted form. The circular muscular fibers are divided by bands of fibrous tissue which extend circularly around the canal, and outward anteriorly, connecting with the fibrous meshes of

pelvic tissue, the ligament of the bladder, the broad ligaments of the uterus, the prostate, and the fibrous sheaths of the levator muscle. These facts are important in that they show how the rectum may be contracted not only from inflammatory processes in the walls themselves, but also by traction upon these circular fibers through the distention and inflammation of the perirectal tissues. Moreover, any inflammatory processes developing in these tissues may travel along the tract of these fibers, invade the rectal wall, and result in a true submucous stricture, for which no ulceration of the rectum or solution of continuity in the mucous membrane need be evoked as the cause. The fact that these circular bands of fibrous tissue enter into the conformation of the valves of Houston renders it easy of comprehension that contraction of these valves may result from perirectal inflammations without any involvement of the mucous membrane or the surfaces of the valves themselves. The majority of cases in which the contraction of these valves has any influence in the production of constipation will be found in cases that have had pelvic, peri-uterine, or periprostatic inflammations.

SPASMODIC STRICTURE

Under the term spasmodic stricture two conditions have been described which are entirely dissimilar. In one there is a stricture in which there are no organic changes in the walls of the gut; it consists in a spasmodic contraction of the muscles without any actual shortening. In the other, a condition is described in which organic change and permanent constriction of the tube is produced through persistent spasmodic contraction, resulting in shortening and fibrous transformation of the muscular fibers involved. While spasm of the œsophagus and urethra are commonly admitted by every surgeon, the existence of a purely spasmodic stricture of the rectum has been denied almost universally. Van Buren (*Diseases of the Rectum*, p. 318) said: "No modern authorities admit the existence of pure spasmodic stricture of the rectum, except in its lowermost portion where it is surrounded by the external sphincter." He stated that the majority of the cases in which such a stricture had been diagnosed were the victims of hypochondria due to chronic constipation and dyspepsia; the difficulty in the movement of the bowels suggested to them probability of obstruction or stricture, and the fact that the passage of a rectal bougie stimulated the organ to peristaltic action and thus facilitated the faecal passages, tended to confirm the erroneous impression. Moreover, the fact that a rectal bougie is very liable to be arrested by a fold of mucous membrane or by the promontory of the sacrum, is also likely to convince the inexperienced surgeon himself of the existence of such a stricture. In sup-

port of these views Van Buren quoted 2 cases, 1 in the practice of Syme, and 1 in his own, in which patients suffered from symptoms of stricture of the rectum, were treated for the same, and yet upon post-mortem no stricture whatever was found. The cases cited are, unfortunately for his argument, just the class for which those who believe in spasmodic stricture of the rectum contend. The facts that no organic stricture existed, that the patients' symptoms showed positively some obstruction to the passage of fecal matter, and also that the rectal bougie after having passed through the apparent obstruction was still grasped and held tightly, show very clearly that there existed during life a muscular spasm resulting in a greater or less constriction of the rectal caliber. There is no answer to the argument that, reasoning from analogy, one may expect to find spasm of the circular fibers of the rectum even more marked than in the œsophagus, the larynx, and the urethra. Contraction of the circular fibers of the intestinal canal may be excited by the electric current, and it is not unreasonable to suppose that certain irritating substances may do the same, and thus bring about a spasmodic constriction of the rectum. That such a condition is very frequent is not asserted, but that it does occur, and especially at the juncture of the rectum with the pelvic colon, is absolutely certain. The author has time and again attempted to introduce a cylindrical tube through this portion of the canal, and notwithstanding that the direction of the cavity was clearly in view, has been unable to pass the instrument upward until after the spasm had relaxed. Upon withdrawing the tube in these conditions the parts may be seen to contract like a rubber band, almost entirely occluding the orifice. Whether there exists in these conditions some sensitive area of mucous membrane or some irritable nerve-end, it is not possible to say, but frequently in the same individual it is impossible to introduce the tube on one day on account of such spasm, whereas on the next it is passed in without any difficulty; certainly there can be no pathological or organic change varying from day to day which would cause such an obstruction. While prolapse of the sigmoid into the rectum would prevent the introduction of the tube, such a condition is not difficult to recognize through the instrument, and therefore would have no weight in this argument. The other condition which might possibly account for the changes from day to day is the angle of flexure of the sigmoid upon the rectum, which may vary. With the pneumatic sigmoidoscope, when no adhesions exist, the sigmoid may be lifted up by inflation entirely out of the pelvic cavity, and yet the narrowing at the juncture between it and the rectum will remain and appear larger at one time than at another. Sometimes it will admit a No. 3 tube, while at others it is difficult to introduce a No. 1. No one denies the fact that spasm of the sphincters may be so marked as to interfere with stool or the pas-

sage of instruments, and thus constitutes a type of stricture which may be excited by small ulcerations, fissures, or foreign bodies. The proof of this lies in the fact that the stricture disappears as soon as these conditions are relieved. Whether they are called strictures, constrictions, or muscular spasm is a matter of indifference, but the fact remains that spasmodic contraction of the circular fibers does occur, and produces symptoms that resemble those of organic coarctation.

Concerning the other type, that in which organic changes follow a persistent spasm of the muscle, there seems to be considerable difference of opinion. No one claims that spasmodic contraction of the rectum can be permanent; Cripps (*op. cit.*, p. 223), however, claims that it may continue long enough to produce permanent shortening of the muscles, and cites as comparable to this the contraction which occurs in the hamstring muscles in cases of chronic inflammation of the knee-joint, and goes on to argue that while such a contraction is at first an intermittent one resulting from irritation in the joint, after a while atrophy of the muscular fibers takes place, and permanent shortening results. In this stage, he says: "The contraction ceases to be one of muscular action, but the shortening remains permanent even after the source of the irritation has been removed." From this analogy he argues that any irritation in the rectum may produce a similar contraction of its muscular walls, and if such irritation continues it may result in a permanent shortening of the fibrous elements of the muscle, thus producing fibrous stricture. In support of this view he relates the case of a woman in whom he found an ulcer in the posterior part of the bowel with an annular stricture situated about 2 inches from the anus, well above the sphincters; upon examining the patient a few days later under ether the ulceration was unchanged, but the stricture had practically disappeared. He afterward learned that by introducing the finger somewhat roughly the stricture was immediately reproduced, but by keeping it gently in contact with the part, a gradual relaxation took place, so that the finger would lie comparatively easy in the narrowed part; upon any rough movement it could be felt to be palpably and immediately grasped and again relaxed in a few seconds. As the ulcer healed the stricture gradually disappeared, and the woman left the hospital apparently well. Two years later Dr. Cripps was called to see this same patient. On examining the rectum he found at the site of the previously soft and yielding stricture a firm, hard, unyielding fibrous contraction narrowing the bowel almost to occlusion. In support of this view Ball (*op. cit.*, p. 139) reports a similar case. They both hold that the irritation that occasioned the muscular contraction had resulted in a permanent shortening and alteration of the muscular fibers, which finally produced a fibrous stricture of the rectum. According to their

views both the circular fibers and those of the levator ani were involved. The author has seen this spasmodic contraction of the rectum a number of times in patients in whom there was ulceration of the mucous membrane. It is always just above the point of ulceration, and it is reasonable to suppose that the repeated contraction of these muscles due to irritation of the faecal passages may result in their shortening, but it seems more rational to account for the stricture by the plastic deposit which occurs beneath the ulceration and its known tendency to extend and develop into fibrous tissue. It appears, therefore, that this type of stricture is not spasmodic, but the result of inflammation, and should be included in the latter class.

INFLAMMATORY STRICTURES

These include all those strictures due to *simple*, *tubercular*, and *syphilitic* inflammations. The simple type comprises diffuse inflammatory, cicatricial, and perirectal strictures.

The Location.—The site of inflammatory strictures varies greatly; they may occur at any point from the margin of the anus to the upper limits of the pelvic colon, though the large majority begin within the first 6 centimeters of the anus. Excluding 258 cases collected by Perret (Thèse, Paris, 1856, No. 34), and 21 by Quénu and Hartmann (*op. cit.*, vol. i, p. 253), 110 additional cases have been collected; of these the sites were as follows:

Below 6 centimeters ($2\frac{1}{4}$ inches).....	65
At 6 centimeters.....	5
From 6 to 9 centimeters ($2\frac{1}{2}$ to $3\frac{1}{2}$ inches).....	18
Above 9 centimeters ($3\frac{1}{2}$ inches).....	12
In the pelvic colon.....	10

Quénu and Hartmann in 21 cases found only one stricture beginning as high as 6 centimeters ($2\frac{3}{8}$ inches) above the anus. In the author's collection there occur no less than eight syphilitic and four tubercular strictures above 9 centimeters ($3\frac{1}{2}$ inches). There is no question, however, that the majority of strictures of these parts are within the first 8 centimeters above the anus.

Diffuse Inflammatory Stricture.—These consist in an inflammatory or fibrous deposit beneath the mucous membrane. Lesions of this membrane may occur from various causes, and heal, leaving a perfectly normal surface with plastic deposit in the submucosa which continues to increase, undergoing transformation into fibrous tissue until it partially or completely surrounds the rectum, thus forming a stricture (Fig. 164).

In all inflammatory strictures, whether simple, tubercular, or syphilitic, the process must involve the tissues below the mucosa. Ulceration

or injury of the mucous membrane alone will not produce a stricture, and for this reason it is rarely ever caused by simple catarrhal diseases. If the inflammation once involves the submucosa it is likely to extend beneath the mucous membrane in all directions, owing to the distribution of blood-vessels and lymphatics in this tissue. This causes the diffuse inflammation which is followed by stricture or the *rectitis stenosante* of French authors.

CICATRICAL STRICTURE.—If those which follow surgical operations are excluded, true cicatricial strictures will be found to be far less frequent than is generally supposed.



FIG. 164.—LONGITUDINAL SECTION OF STRICTURE OF THE RECTUM.

Wherever the normal surface membrane is restored without intervening fibrous tissue, no cicatrix can be said to exist. Cicatricial stricture, therefore, must be confined to those cases in which there has been destruction of tissues and replacement by pure fibrous or cicatricial material. Phlegmonous and gangrenous ulcerations, such as result from diffuse gangrenous proctitis, may result in cicatricial stricture of the rectum. Operations in which considerable areas of rectal tissue have been removed, and healing by granulation takes place, will also occasion them.

All sorts of traumatisms which cause sloughing of the rectal wall, as, for example, prolonged pressure of the head during childbirth or the retention of large foreign bodies in the rectum, may result in this type of stricture. Mollière has pointed out that gangrene of the rectum or anus following certain forms of fever has resulted in the destruction of large areas of the rectum and produced cicatricial stricture.

Kelsey, Tanchou, Curling, Esmarch, and others have reported cases of cicatricial stricture that resulted from the introduction of foreign bodies into the rectum; Krouse (Med. Record, 1892, vol. ii, p. 506) reported a case of cicatricial stricture that resulted from a burn; Jeannel has related a case in which cicatricial stricture resulted from the injection of pure tincture of iodine into the rectum; Quénu and Hartmann state that other cases are due to accidental injections of caustic substances, such as nitric or sulphuric acid, into the rectum (*op. cit.*, p. 252). The author saw a stricture of this type follow the accidental introduction of a strong solution of chloride of zinc into the rectum.

Cicatricial stricture is one of the complications or unfortunate sequences of operations for excision or resection of the rectum either by the sacral or perineal methods; especially is this likely to occur if end-to-end union is attempted in that region of the gut surrounded by the levator ani muscle. Operations for fistulas and for hæmorrhoids have also resulted in this condition. Recently, owing to the attempts of incompetent surgeons to perform the Whitehead operation, more cicatricial strictures are seen than formerly. In the Medical and Surgical History of the War of the Rebellion there are reported 4 cases of stricture of the rectum due to gunshot injuries; all of these, however, suffered from perirectal inflammation and fistula, together with considerable sloughing and destruction of tissue in the rectal walls themselves; in 2 the wound of the rectum was complicated by that of the bladder, and in 2 others of a similar nature the patients died from urinary extravasation before the wound in the rectum healed. Wherever an extensive destruction of tissue results in a granulating ulcer, an examination of this condition during the ulcerative period will always elicit a loss of elasticity in the rectal wall due to inflammatory infiltration, and, as Esmarch held, this infiltration has more to do with the stricture than the actual contraction of the cicatrix. Quénu and Hartmann state (*op. cit.*, p. 24) that the cicatrix is not so much the cause of the stricture as is the hyperplasia in the submucous tissues. It may thus be stated that the majority of so-called cicatricial strictures are really of the diffuse inflammatory type. The cicatricial strictures which occur around the margin of the anus following extensive ulcerations and operations in this region compose a large percentage of those which one meets with at the present day; there is no restoration of the cutaneous or muco-cutaneous membranes, but a true, shining, cicatricial mass takes their place.

PERIRECTAL STRICTURES.—By these we mean those strictures which develop from conditions outside of the rectum. Displacements, enlargements, and tumors of the uterus, ovaries, bladder, prostate, or other pelvic organs may cause obstruction in the rectum or sigmoid by pressure, but these are not strictures. The writer has seen one case of abso-

lute occlusion of the rectal canal due to extra-uterine pregnancy; the foetus broke through the intestinal wall and was delivered per anum, but after this the caliber of the gut was at once restored.

Local or general peritonitis not infrequently produces rectal stricture. The adhesive bands formed by these inflammations either pass across the gut and bind it down to the bony structures like a ligature, or they may narrow its caliber by holding it in an acutely flexed position; this is illustrated by a case in which it was impossible to pass even a No. 6 Wales bougie through the first loop of the sigmoid flexure on account of the acute bend of the intestine at the recto-sigmoidal juncture caused by an adhesive band holding it down in Douglas's *cul-de-sac*. After the adhesion was broken up and the sigmoid flexure lifted out of the pelvis, it was possible to pass without any difficulty a No. 12 bougie its full length. Hartmann (*Annales d'gyn.*, Paris, 1894) has related 2 cases of this kind. Broca (*Bull. soc. anat.*, Paris, 1852, p. 49) has described a case in which two such adhesive bands embraced the rectum, almost encircling it, and caused constriction. Inflammatory adhesion of the uterus to the rectum or to the sacrum at one side or the other may, by dragging the broad ligament of the opposite side across the gut, cause stricture (Stone Scott, *Med. Record*, 1893, vol. ii, p. 264). The stenosis in Scott's case was relieved by breaking up the adhesions between the uterus and the sacrum, and thus lifting the broad ligament from the rectum.

Another cause of stricture from extra-intestinal conditions is adhesion of the appendices epiploicæ to the abdominal walls, or, as has been seen recently, to one another. The pedicles pass across the gut and contract it to such an extent that it forms a perirectal stricture.

Many authors have recorded cases of peri-uterine inflammation that involved the rectal wall and caused inflammation of the same with subsequent stricture (Balzer, *Bull. de la soc. anat.*, Paris, 1877, p. 402; Biggs, *Med. Record*, 1893, vol. i, p. 153; Quénu and Hartmann, vol. i, p. 247). Cases have been treated in which after the uterus was dissected loose, the rectal wall remained thickened, indurated, and contracted in its caliber. The passage of rectal bougies in such conditions occasioned much pain, which was attributed to the pressure upon the uterus or the ovary; while some of the pain was due to this, most of it was occasioned by the inflammation in the tunics of the gut itself. The longer this inflammation continues the greater will be the development of fibrous tissue in the walls. The circular muscular fibers, owing to the fact that they are held by adhesions and inflammatory plastic material and can not contract, will become atrophied and transformed into fibrous tissue.

Prostatic disease may also cause perirectal stricture. The writer once saw a case of this kind. The patient was sixty-one years of age

and had never suffered from venereal disease, but gave a history of prostatic abscess which discharged through the urethra. From that time forward he began to notice difficulty in stools and a heaviness and weight in the sacrum; he had never had any loss of blood or pus from the rectum, and no hemorrhoids had ever prolapsed. The mucous membrane of the rectum, barring some traumatism made by the forceps in efforts to relieve an impaction, was absolutely healthy, but the organ was bound closely to the prostate, which was large and indurated; a circular fibrous band constricted the rectum at the upper limits of the prostate and seemed continuous with the capsule of the gland. It had evidently been produced by inflammation of this organ. Kirmisson and Desnos (*Annales des maladies des organes génito-urinaires*, Paris, t. vii, p. 72) have called attention to stricture of the rectum resulting from chronic inflammation of the prostate.

A specimen (Fig. 165) taken from the body of an old man at the New York Almshouse exhibited a remarkable condition of affairs. The rectum

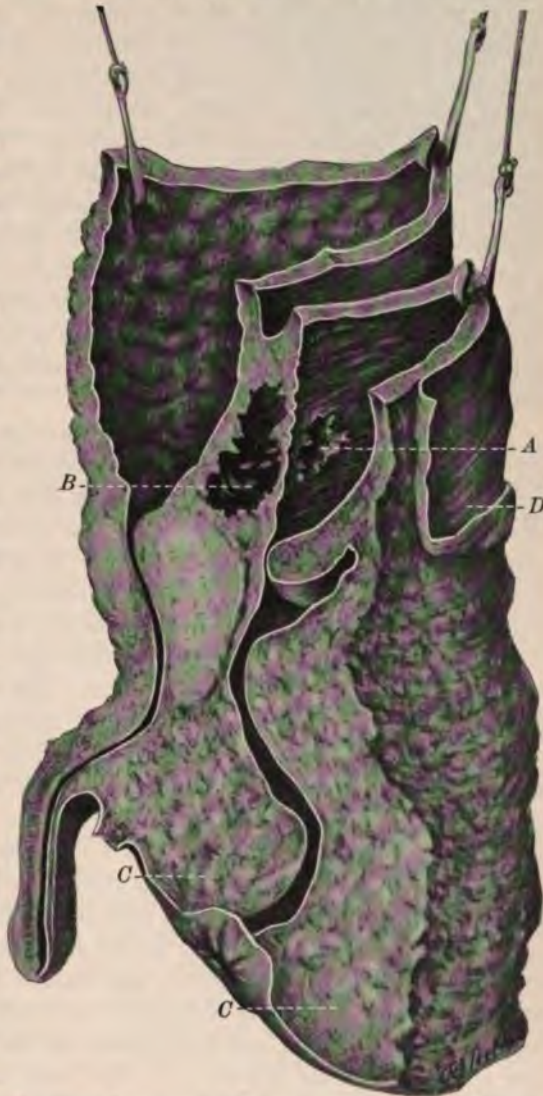


FIG. 165.—STRUCTURE OF RECTUM DUE TO PROSTATIC INFLAMMATION.

A, perforation of rectum; B, cavity in which lemon-seeds were found; C, inflammatory hyperplasia; D, peritoneum.

consisted in a very narrow, tortuous tract surrounded by dense fibrous tissue. About 3 inches above the anus was a perforation of its walls leading to an abscess cavity in which were several lemon-seeds. This cavity appeared to be in the lobe of the prostate. Jeffries, who examined the specimen microscopically, stated that the tissue all around the supposed rectal canal was of a prostatic nature, and that careful study failed to reveal any normal rectal tissue whatever. The fact that the lemon-seeds were swallowed shortly before death and found in this narrow tract proved its connection with the alimentary canal. The patient was brought into the hospital moribund, and consequently no history was obtainable. It is without doubt a remarkable stricture of the rectum due to prostatic inflammation and hypertrophy. While stricture from this cause is rare, there are numerous cases in which it has resulted from pelvi-rectal abscesses originating in the prostate or in the broad ligaments.

Blind external fistulas may be the cause of perirectal stricture. They do not involve the mucous membrane, but cause inflammation and fibrous deposit around the gut, thus occasioning true stricture. Henry Smith (*Surgery of the Rectum*, 1876) states that in such cases the stricture is always the cause of the fistula, but he is certainly mistaken in this. Cripps (*op. cit.*, p. 230) cites a very interesting case in which he was able to follow the patient from the time the abscess appeared until the stricture formed. He examined her thoroughly in the beginning, and found no contraction of the rectal canal. She was kept in the hospital for twelve weeks, no internal opening of the fistula having ever developed. Eighteen months later she was readmitted to the hospital and was found to be suffering from a well-marked stricture. He says: "It is a matter of some surprise that the irritation of the fistula should so seldom be followed by stricture, and I think it will probably be found only when the fistula extends some distance between the coats of the bowel, with a tendency to abscess formation, that the irritation is sufficient to cause stricture." The writer has seen a patient in whom a small but deep perirectal abscess was opened early through the perinæum, and was followed by stricture of the rectum; there was never any lesion inside the rectum, and this abscess was the only discoverable cause. One could argue that the stricture had been occasioned by a previous ulceration of this organ, but there is not the slightest evidence of this. With these facts in view, it must be concluded that true fibrous stricture of the rectum may be occasioned by inflammatory processes and irritations entirely outside of the organ, without any infection from within or any solution of continuity in the mucous membrane of the gut.

In an article entitled *Phantom Stricture* (*Am. Jour. Med. Sci.*, October, 1879, p. 334 *et seq.*), Van Buren described 4 or 5 cases of this type in

which he states that the strictures are due to inflammatory deposits in the pelvis and about the rectum, or to constricting bands resulting from pelvic inflammations without involving the rectal wall itself in any pathological changes. Illustrative of how pelvic growths and malposition of the uterus may simulate stricture of the rectum, he cites the case of a young woman of twenty-five who could not relieve her bowels while in the usual position, and was compelled to resort to the use of a bedpan. As she lay in the Sims's position nothing abnormal could be felt or seen in the rectum, but when she stooped in the squatting position Van Buren was able to recognize a globular tumor forced firmly backward into the hollow of the sacrum so as to completely occlude the rectal caliber. This tumor proved to be a fibroma about the size of a billiard-ball, which had developed in the posterior wall of the uterus. These conditions, while not constituting stricture in themselves, may produce it by exciting inflammation in the rectal walls through pressure and obstruction.

TUBERCULAR STRICTURE.—The existence of tubercular stricture in the rectum or sigmoid is often denied. Pathological examinations have positively demonstrated not only the inflammatory results of tubercular ulceration, but the presence of giant-cells and tubercle bacilli in the stricture itself. The fact that tubercular ulcerations of the rectum are so rarely primary, and that when they occur in cases that have already developed the constitutional disease they seldom heal before death takes place, has led many to suppose that such a condition was impossible.

Recently the author had the opportunity to examine the bodies of a number of patients who died from tuberculosis, and in four instances he met with undoubted fibrous stricture existing beneath well-developed tubercular ulcers; in 2 of the cases the stricture was in the pelvic colon, and in the other 2 within the rectum; one was low down, and the other 4 inches from the anal margin. In neither of the latter instances had the stricture contracted to such an extent as to greatly constrict the gut, but in those in the sigmoid flexure the calibers had been reduced to about one-fourth their normal size. Were the conclusions with regard to the etiological influence of tuberculosis in stricture to rest upon these post-mortem examinations alone, it would be well founded; but there is more: two of these patients had distinct histories of chronic, obstinate constipation alternating with diarrhoea, discharges of pus and mucus, and all the concomitant symptoms of true stricture. Moreover, the histological examination of these specimens demonstrated the existence of tubercle bacilli, giant-cells, and embryonic cells outside the area of the ulceration.

In the section upon Pathology it will also be seen that the examinations of Mitchell, Hartmann, Toupet, and others have demonstrated

these same characteristics, and thus proved beyond the shadow of a doubt that tuberculosis may result in the formation of true fibrous stricture of the rectum without the ulcers having healed. This is in harmony with the fact pointed out in the chapter on Tuberculosis of the Rectum, that around every tubercular focus there is a fibrous wall tending to limit its extension. This fibrous deposit which causes the stricture is inflammatory, but the inflammation is caused by localized tuberculosis.

SYPHILITIC STRICTURE.—For many years the controversial war concerning the influence of syphilis in the production of rectal strictures has been waged. As far back as 1815, Richeraud (*Nosographie chirurgicale*, t. iii, p. 428) spoke of "condyloma internis" as a cause of stricture, and from that time onward the subject has been more or less constantly discussed in medical literature. Many of the early writers, as White, Morgagni, Symes, Erichsen, and Talmann, failed to mention it in their writings upon stricture; while others, as Bush, Copeland, and Curling, absolutely denied its etiological significance.

As experience widened and observation became more exact, it gradually became established that a large number of patients suffering from stricture of the rectum had been victims of syphilis, or at least venereal disease. At this period we find such men as South (*Chelius's Surgery*, Am. ed., p. 47), Lansereaux, Hamilton, and Smith stating boldly their opinions that *syphilis is a cause of stricture*.

The field of controversy then changed. Surgeons generally admitted that venereal diseases, so frequently present in cases with stricture of the rectum, must have some influence in producing it. They were unwilling to concede, however, that it was through a constitutional process. Thus we find Gosselin (*Arch. gén. de méd.*, 1854, p. 66) taking the stand that the strictures in these cases were never due to constitutional syphilis, but always to a local sore, chancroidal in its nature. This theory was adopted by a large number of surgeons, such as Gross, Van Buren, Bumstead, Mason, and Van Harlingen. Mason published a series of 31 collected cases to prove this theory, but of these 15 had true constitutional syphilis; Van Buren stated that he had seen chancroidal ulcer followed immediately by stricture of the rectum. The facts, however, would not sustain this theory, for the majority of syphilitic strictures occurred from 1 to 4 inches above the anus, and chancroids rarely extend above the muco-cutaneous margin. The initial sore of syphilis accounted for it no better, because this was so seldom found in the rectum at all. It was finally referred to some insidious process brought about by the constitutional effects of this protean disease. This theory was accepted, and at one time became so popular that every patient suffering from stricture of the rectum was at once pronounced syphilitic,

whether there were any other evidences of the disease or not; but how or why it produced stricture was not known.

Fournier (*Lésions tertiares de l'anús et rectum*, Paris, 1875) finally advanced the theory that these strictures consisted in an interstitial hyperplasia ending in a fibrous degeneration and persistent contraction of the walls of the gut, to which he applied the name *ano-rectal syphiloma*, which has been already discussed. This theory of Fournier has been adopted by all syphilographers, and is admitted by rectal surgeons as occurring occasionally, but it by no means accounts for the large majority of strictures in the syphilitic which do not conform to this type of the disease.

The question has heretofore been studied from a clinical point of view, and each surgeon has drawn his conclusions from the sequence of symptoms and the unreliable histories of his patients. With better knowledge of the pathological changes which occur in syphilitic inflammations, opinions are now based upon the actual alterations in the tissues.

Microscopic examination of a sufficient number of these strictures has been made to prove positively that they consist in the tissue changes ordinarily seen in secondary and tertiary syphilitic inflammations, and therefore it is concluded that while syphilis does not occasion so many strictures as was formerly supposed, it nevertheless is accountable for a considerable proportion of them. The question is no longer "Does it produce stricture?" but "What is the process by which it does so?"

The writer has expressed his positive conviction that all these strictures are preceded by ulcerations (p. 250). In order to substantiate this opinion he must anticipate somewhat his conclusions from the pathological studies of this condition. Microscopic examinations of syphilitic stricture of the rectum show that the condition consists in a chronic, inflammatory deposit characterized by nodular or gummatous formations around the blood-vessels and distinct endarteritis. The fibrous development or the stricture itself differs in no other way from those strictures due to simple traumatism and infective ulceration of the rectum. There has been no histological examination of an ano-rectal syphiloma in its early stages so far as is known. In a somewhat extensive experience in rectal and genito-urinary diseases no stricture of this type has been seen in which the probability of previous ulceration of the rectal wall could be eliminated. All the cases which have suffered from this condition have either been ulcerative at the time, or they have given the history of previous discharges of blood, mucus, or pus from the rectum, showing the inflammatory nature of the process.

The theory of Fournier was more attractive in 1876 than it is to-day, because at that period local examination of the rectum was much neg-

lected in the secondary and early tertiary periods of syphilis, and therefore the ulcerations and inflammations of these periods were overlooked. Many cases of syphilis develop a diarrhoea and discharge of mucus during the secondary stages which are generally attributed to the mercuric remedies administered; whereas they are in fact the result of mucous patches or ulcerative processes in the rectum itself. The writer has demonstrated this fact more than once to the students at the Polyclinic Hospital, and he believes that these early lesions of secondary syphilis are always the beginning of Fournier's ano-rectal syphiloma. Under the influence of mercury, which every layman knows for himself to be the remedy for syphilis, these symptoms disappear, the ulcers in the rectum heal, and the patient supposes himself to be well. The discontinuance of treatment, however, results in the reestablishment of the pathological process in the submucous tissue along the arteries and veins in the shape of minute gummatous deposits around these vessels, and in the muscular walls as an hypertrophy of the unstriated muscular fibers and connective-tissue fibers which lie between them. Here there are two distinct processes; one a specific involvement that extends in the line of the blood-vessels, the other a purely inflammatory condition that extends in the line of the submucous, muscular, and fibrous tissues. This submucous inflammation, set up by the original ulcer and continued by hard faecal passages and the presence of abnormal gummatous deposits, is really the cause of contracture, and forms the true fibrous portion of the stricture. It therefore seems probable that a very large majority of syphilitic strictures of the rectum originate in some ulcerative lesion of the mucous membrane of the intestine, and that these lesions, due to secondary or tertiary syphilis, comprise most of the so-called chancroids which were supposed at one time to account for so many strictures of the rectum.

Pathology of Stricture.—We are indebted largely to Malassez, Cornil (*Leçons sur la syphilis*, p. 412), Panas and Valtat (*Bull. de la soc. de chir.*, Paris, 1872, pp. 543, 572), Hartmann and Toupet (*Semaine médicale*, 1895), M. Sourdille (Quénu and Hartmann, *op. cit.*, pp. 278, 281, 283), Jeffries, and M. Girode for most of our information upon this portion of the subject.

In the early stages of the disease macroscopic appearances show the existence of an ulceration of the mucous membrane or a localized thickening. Whether ulceration be present or not, there is always a lack of elasticity in the rectal wall, a dense, leathery feel, and a decrease in the distensibility of the organ. Where the ulceration has healed, the mucous membrane is dry and has lost its normal shining appearance. Quénu and Hartmann state that this condition is due to the transformation of the cylindrical epithelial cells into the pavement variety.

In our examinations we have not found this, but rather a stratified columnar epithelium from which the goblet-cells are absent. Where the ulceration exists along with the stricture, and there are many cases in which this is the first symptom and continues throughout its course, the rectum will be filled with a muco-purulent, sometimes sanious discharge, and thus the dry, frictional condition of the mucous membrane will not be observed. There is a tendency in syphilitic ulceration to heal in its lower portions while it extends upward. The healed portion appears as a bluish-white cicatrix, dense, hard, and almost ligamentous to the touch. The condition may extend from the margin of the anus to the pelvic colon, and even sometimes involve the lower loops of this portion of the intestine. Occasionally the symptoms of obstruction will be out of proportion to the actual fibrous contraction of the intestine. In these cases we have to deal with the "rectitis proliferante" of Hamonic (*Annal. méd. chir. trans., France et Étrang.*, 1886, vol. ii, p. 3). In one case observed by the author the proliferating granulations almost entirely filled the rectal cavity, obstructing the passage of feces and causing an abundant purulent and bloody discharge; after a colotomy, and under specific and local treatment, they entirely disappeared, but left a contracted stricture of the rectum.

The fibrous portion of the stricture is not always the narrowest; sometimes the congestion and proliferating granulation cause greater narrowing of the canal than the actual cicatricial contraction. Where the ulcer is small, extending over a limited portion of the circumference of the intestine, the diminution of the caliber will be at first proportionately slight, and yet after such ulcerations as this have healed the circular fibrous contraction may proceed and cause extensive strictures, notwithstanding the fact that medication has controlled the syphilis. In these cases the stricture possesses only the histological characteristics of the inflammatory type. As has been frequently pointed out, in old cases, especially where the stricture assumes the annular form, there may be two points of ulceration, one above the stricture and the other below it. That above the stricture does not present the character of true syphilitic ulceration even in well-marked syphilitic cases, but assumes that of a simple necrotic ulcer due to the irritation and pressure of fecal materials that lodge at that point. The gut is always dilated and the walls thinned above the stricture. The ulcer below is of the type that produces the stricture, whether it be infectious, syphilitic, or tubercular. The fact of an ulcer existing below the stricture has been said by Ball to indicate that the stricture was caused through spasmodic contraction of the circular fibers, and their consequent hypertrophy and shortening due to the efforts of the intestine to rid itself of the irritating focus. This is an ingenious theory; it explains the fact that while the

mucous membrane is ulcerated above and below the strictured area, that over the contracted portion appears apparently normal. Fistulous tracts are occasionally found beneath the mucous membrane leading downward



FIG. 166.—STRICTURE COMPLICATED BY RECTO-VAGINAL FISTULA.

from the stricture, and sometimes outside into the perirectal tissues. In women these fistulas may break into the vagina, thus occasioning recto-vaginal fistula (Fig. 166); they sometimes pass through the sphincter muscles or outside of them, causing blind internal, or even complete, fistula. Upon the level of the stricture itself, especially where it is of the annular variety, the mucous membrane may not appear to the eye to be at all altered. An examination with the finger, however, shows that it fails to move over the subjacent tissues, that it is smooth and frictional to the touch, and appears to be amalgamated with the tissues beneath it. Thus we

have, as Malassez pointed out, three positive conditions or locations to study in the pathological examinations: the stricture itself, the parts above, and those below it. Hartmann and Toupet have studied this subject very thoroughly following these lines. One constant feature in all the varieties of stricture which they describe is the absence of ulceration at the level of the stricture and the substitution of pavement epithelium with papillæ for the cylindrical epithelium with glands. The alteration they say is complete, and occurs in all strictures, whether due to syphilitic, tubercular, or infective inflammations. This substitution they also find in chronic catarrhal proctitis, a fact which is significant in indicating the inflammatory nature of strictures, although due to specific causes. Quénu and Hartmann (*op. cit.*, p. 262) record the case of stricture of the rectum in which this substitution of the pavement for the cylindrical epithelium went on to such an extent that a true pachydermatous condition of the mucous membrane of the rectum was established.

Malassez says: "Just above the true stricture the tissue is formed of new elements, is very vascular, and offers little resistance to the passage of instruments; this part of the stricture is narrower than the true connective-tissue portion on account of the increased circulation and cellular

infiltration." Lower down in the widest part of the stricture there are fascicles of hard connective tissue surrounded by embryonic cells which present the characteristics of true cicatricial tissue; sometimes the whole rectal wall is involved in the sclerous process, and sometimes only the internal layers. Even the circular muscular layer may be invaded while the longitudinal layer is uninvolved and separated from the other by a sort of callous infiltration. Hartmann and Toupet say that when the entire thickness of the rectal wall has been involved, there may form around it a sort of "callous fibro-lipomatous" mass. In one case in which they made a histological examination of the stricture removed, the whole mass was composed of fatty cells dissected by fibrous bands and ramifying blood-vessels with hypertrophy of the walls, thickness of the intima, and reduced caliber. The external coats were separated by small round cells, the nuclei of which were easily stained. Here we have no evidence of syphilis or tuberculosis, but simply a type of inflammatory infiltration. In another case, however, presenting practically the same pathological changes in other respects, they have demonstrated the existence of typical syphilitic endarteritis and small gummatous deposits all along the course of the arteries and veins. In both of these cases the blood-vessels are encroached upon until they are practically occluded at certain points. In the fibrous tissue there appear at places certain new blood-vessels, but this collateral circulation is not constant. The features which were always present in syphilitic stricture are endarteritis and the small nodular developments about the arteries, which are gummatous in their nature, some of them seeming to have softened down in the center. The nodules are not so constantly situated around the veins as around the arteries, but they also occur in this location.

In tubercular stricture one finds a different condition of affairs. Ordinarily the entire epithelial surface of the mucous membrane will be found destroyed. Quénu and Hartmann state that the epithelium destroyed is replaced by the pavement-striated variety. The examinations made for the author by Heitzmann and Jeffries do not demonstrate any such substitution in these cases. They show that the epithelium has entirely disappeared. The inflammatory infiltration extends considerably beyond the ulceration. Upon the mucous membrane a number of papillæ are seen, and in the submucosa in the infiltrating fibrous tissue there are here and there tuberculous follicles which show a tendency to caseous degeneration. The blood-vessels are crowded and somewhat occluded; they are diminished in number, but they show no alteration in their walls. Hartmann and Toupet state that in 50 preparations they were able to find only 2 in which they could demonstrate the existence of an arteriole in the deep mucosa, and in this they perceived no appreciable

alterations. There were numerous capillaries, however, the lumens of which were quite narrow.

The following report on a case observed by the author corroborates the above observations, with the exception of the substitution of pavement for cylindrical epithelium:

Syphilitic Stricture of the Rectum—Histological Examination
by F. M. Jeffries

Six inches above the anus a stricture is presented. At this point the lumen of the gut is greatly diminished so as to hardly admit the passage of a probe the size of a lead-pencil. It is tortuous, and numerous crypts and pockets beset its course. The walls here are generally thickened.

Above the stricture the colon wall is thin and distended and the gut is engorged with feces. Here again are numerous saccular diverticuli and pockets of all sizes. Just above the stricture are two which are the size of hens' eggs. In addition are numerous small saccular pockets the size of a pea which are filled with feces and are noticeable only from the outside. Viewed from the inside, the sites of these pockets are hardly apparent, but upon close inspection it appears that they are at the sites of solitary follicles. The follicle has disappeared and a small channel has taken its place, giving communication between the sac cavity and the lumen of the gut. Macroscopic examination of these sacs gives the impression that the peritonæum constitutes the sole barrier between the contents and the peritoneal cavity. Microscopically, however, the inner surface is lined with a pyogenic membrane.

Throughout the extent of the large intestine are eight or ten small ulcers, and in the cæcum is a large ulcer which presents the appearance of a union of two ulcers. At this point the walls are thickened and puckered in such a manner as to markedly distort the contour of the gut.

The ulcers are of fairly uniform size and appearance, averaging 1.5 by 2.5 centimeters in diameter. The long diameter of all of them is transverse to the axis of the intestine. (This is the course of the blood-vessels at this part.) Their edges are abrupt and rough, and the mucosa turns downward and underneath. The floors are rough and present slight elevations and depressions. The intestinal wall around and beneath the ulcers is thickened and indurated.

Beneath the peritonæum are numerous small miliary elevations which thickly beset the indurated tissue. Microscopically these are found to be gummata.

At the site of the stricture there is no sign of inflammation either in the mucosa or the remaining coats. There is a marked hypertrophy of the inner and outer muscular coats, and associated with this change is an increase of fibrous tissue confined largely to the external muscular coat. The submucosa is closely studded with blood-vessels most of which present thickened walls.

Microscopical examination of the tissues of the edge of one of the ulcers resulted as follows:

Acute inflammation manifested by an exudative infiltration pervades the entire thickness of the intestinal wall from the mucosa to the peritonæum. The infiltration is of the small round-celled variety and is most marked in the muscular coats and the submucosa. The arteries throughout are increased in numbers and present thickened walls, in some cases with obliterated lumina. The thickening is con-

lined largely to the intima, and in many instances there appears to be an exfoliation of endothelial cells which are embedded within the mass of blood-corpuscles. These cells are somewhat swollen, but exhibit no further degenerative change and stain nicely.

The intestinal wall is thickened, the increase largely confined to the submucosa. This is due in part to fibrous tissue, but principally to the fact that it is thickly beset with gummata most of which are miliary in character.

One large gumma 3.20 centimeters by 1.76 centimeters ($1\frac{1}{4}$ by $\frac{3}{4}$ inch) in diameter is situated just beneath the ulcer; another, external to the muscular coats, is 1.60 centimeters by 2.80 centimeters ($\frac{5}{8}$ by $1\frac{1}{4}$ inch) in diameter.

A few giant-cells are found. These are rich in nuclei, the latter being scattered irregularly throughout the protoplasm of the cell.

The mucosa adjacent to the ulcer exhibits the small round-celled infiltration of acute inflammation. *The epithelium of the villi is desquamated, but that of the crypts of Lieberkühn is intact.* At the edge of the ulcer the mucosa abruptly ends, leaving but a thin layer of the deepest strata, including the ends of two or three crypts, forming the floor of the ulcer. The muscularis mucosæ remains intact throughout.

The smaller gummata are made up of aggregations of small round and epithelioid cells which are somewhat loosely connected and present an appearance suggesting a more or less fluid intercellular substance. The outer zone of these nodules is made up of the usual small round cells with a few fibers of connective tissue intermingling and rather numerous blood-vessels, some of which extend to the interior. Within this outer zone giant-cells are occasionally seen. In some of these nodules necrotic changes have occurred, and their centers present an appearance resembling cheesy degeneration wherein no nuclei are manifest.

The two larger gummata differ so in their structure that they will be described separately.

The larger, situated in the submucosa, is surrounded entirely by fibrous tissue, though it is scant in some portions. Within the fibrous coat is a thin layer of small round cells, embedded in which are numerous capillary blood-vessels and one or two large giant-cells. A few connective-tissue fibers are also found and they are more abundant in the margin toward the center.

The greater part of the nodule is made up of necrotic substance thickly beset with nuclei, most of which are fragmentary, the fragments of each nucleus remaining grouped in close apposition.

The remaining nodule is situated external to the muscular coat and is surrounded by a fibrous capsule which is thicker than the one just described. Within this fibrous coat, sharply defined from it, is a thicker layer of epithelioid cells, spindle-shaped and round, and with large intercellular spaces. This layer is devoid of blood-vessels and presents one or two giant-cells. The interior is a necrotic mass resembling complete cheesy degeneration, and contains minute fragments of nuclei only, except at its periphery, where a few larger fragments are seen.

A succinct statement of the differences in the pathology of the three typical varieties of inflammatory strictures will be found in the following table, which is briefly summarized from the works of Toupet, Jeffries, Mitchell, Malassez, Hartmann, and Sourdille:

SIMPLE INFLAMMATORY
STRICTURE

The destruction of the cylindrical epithelial layer and the substitution of the same by striated pavement epithelium. (Found only by French pathologists.) Diffuse sclerosis of the submucosa with amalgamation of all the coats of the bowel, excepting, perhaps, the external muscular layer. Decrease in the number of blood-vessels, but no marked changes in the arterial walls. Occasionally calcareous deposits or fibrolipomatous infiltration around the outside of the walls.

TUBERCULAR

The epithelium and the superficial mucosa may be entirely destroyed and the whole strictured surface ulcerated. Where the mucous membrane covering the strictured portion remains intact, the columnar epithelium is transformed or replaced by the pavement epithelium (Hartmann and Toupet). Fibrous bands more or less dense extend throughout the submucosa. These bands are separated here and there by tuberculous follicles. The blood-vessels themselves are only altered in their external walls by infiltration with embryonic round cells. Giant-cells exist in the more superficial portions of the fibrous tissues, gradually decreasing as one extends outward from the caliber of the gut.

Tubercle bacilli are found in the granulations, but disappear altogether in the sclerous portion.

SYPHILITIC

On the level of the stricture the mucous membrane may be absolutely destroyed and replaced by true cicatricial tissue, or the inflammatory process having been due to specific inflammation without great destruction of tissue, the mucous membrane is reformed over the strictured portion. In such cases we have still the substitution of the pavement for the cylindrical epithelium (Hartmann and Toupet). The sclerous or fibrous degeneration of the submucosa and muscular walls of the gut is homogeneous throughout. The blood-vessels show infiltration of all their walls with distinct thickening of the endothelium, narrowing of the caliber, and all the evidences of specific endarteritis. Around both the arteries and veins are gummatous nodules with clearly defined outlines, some of which present evidences of softening in the center.

Rieder states (*Annales de path.*, 1898, p. 545) that sometimes the submucosa exists only as a thin connective tissue and cellular layer with miliary gummata scattered throughout it, and that the walls of the veins alone may be involved, the arteries remaining normal. These statements have not been corroborated.

It is by no means so easy to distinguish these varieties, even with the microscope, as it would seem from the above. A chronic inflamma-

tory condition with endarteritis is ordinarily considered as an evidence of constitutional syphilis, but endarteritis has been known to exist in inflammations due to traumatism and caustic substances. It is not justifiable, therefore, to base a diagnosis of syphilitic stricture upon the existence of this condition alone. We must have other evidences of the disease in the shape of gummatous nodules in the strictured area, and at least a suspicion of the disease in the patient. A simple, diffuse, inflammatory stricture may become infected with tubercle bacilli, and yet not be a tubercular stricture. The finding of the bacillus is not sufficient evidence upon which to base a diagnosis of true tubercular stricture; in addition to this evidence one must have at least the presence of giant-cells with embryonic infiltrations of the perivascular region, and tubercular nodules with well-defined limitations. These conditions may thus be so combined that it is very difficult to determine the exact nature of a stricture even after it has been excised and a thorough histological examination made. Where the patient has a history of tuberculosis or syphilis, one may presume upon the possibility of the stricture partaking of the nature of the general disease; but he must always bear in mind that a syphilitic or a tuberculous individual may be afflicted with a simple inflammatory stricture.

Etiology.—Diffuse inflammation of the intestinal walls is undoubtedly the chief etiological factor in the production of stricture. Traumatism, infection, syphilis, tuberculosis, and dysentery may all be the exciting causes. In 313 collected cases, 216 occurred in women; this preponderance of the disease in that sex has been the strongest argument against syphilis being the chief cause of stricture, for while women suffer very much more frequently from the latter than men, men suffer very much more frequently from constitutional syphilis than women. This might be explained were it admitted that stricture of the rectum is frequently due to the initial lesions of syphilis or to chancre, but as has been already shown, this is not the case, and the more frequent occurrence of these lesions about the anus in women will not account for the preponderance of stricture in this sex.

The close proximity of the rectum to the genital organs in women constantly subjects it to injury during childbirth and pressure from the gravid or displaced uterus; constipation is also very much more frequent in women than in men, thus subjecting the mucous membrane to more frequent lesions from this source. It does not seem difficult, therefore, to explain why strictures are more frequent in this sex, especially if we concede the fact that the majority of strictures have their origin in some lesion of the mucous membrane or some traumatism to the wall of the gut.

Wallis (Brit. Med. Jour., 1900, vol. ii, p. 1002), who has seen a num-

ber of these cases, states that in his opinion most rectal strictures are due to septic ulceration or to the pressure of the child's head during labor. Fulton (Kansas City Med. Jour., 1894, p. 181) reports a very positive case in which the stricture followed prolonged pressure of the child's head in the hollow of the sacrum. Duplay (Semaine médicale, 1892, p. 461) states that strictures of the rectum differ in no wise from those affecting the urethra and the œsophagus, and that they are all due to inflammatory processes, the causes of which may be simple infection, traumatism, syphilis, tuberculosis, or any other condition which produces a rectitis with cellular infiltration. Syphilis, as we have already seen and admitted, has an undoubted etiological influence in the production of the disease. The fact, however, that the large majority of strictures show no amelioration from antispecific treatment, demonstrates very clearly that in these cases there is another factor. If the stricture were due to gummata and syphilitic cellular infiltration alone, the specific medication would undoubtedly produce an amelioration of the symptoms. In conclusion it may be said that the fact of a patient's having had syphilis does not prove that a subsequent stricture of the rectum is due to this cause; *the syphilitic may have non-syphilitic stricture.*

Tuberculosis is not duly appreciated as a cause of stricture. Reference has been made in a former chapter to the development of dense connective-tissue walls around tubercular fistulas and ulcers, so it is not surprising to find pathologists claim to have demonstrated beyond the question of a doubt that tubercular inflammation is the exciting cause of a certain number of strictures of the rectum. In the specimen (Fig. 90) we have to deal not only with a tubercular ulceration but also a fistula and a stricture of the rectum combined. Tubercle bacilli and giant-cells, together with embryonic infiltration, were found in the inner layers of the stricture with pure fibrous tissue in the outer layers. Rolleston (Transactions of the Path. Soc. of London, 1890, p. 131) reports 3 cases of stricture of the large intestine due to tubercular deposit, 1 of which was in the sigmoid flexure. In the post-mortem room at the Almshouse Hospital of this city, the author has demonstrated no less than five strictures of the rectum and sigmoid in patients who died from general tuberculosis; the strictures all showed the embryonic infiltration, giant-cells, and tubercle bacilli. This disease is therefore undoubtedly the cause of certain strictures.

In the section upon dysenteric inflammation of the rectum and sigmoid, it was stated upon good authority that many of the specific ulcerations occur in the sigmoid flexure and in the rectum. Wherever ulceration occurs the possibilities of infection, hyperplasia, and fibrous contraction are always present. Mathews, basing his conclusions upon personal experience and the pathological studies of Ouchterloney, states

very positively that dysentery never produces stricture of the rectum. He has many followers in this opinion, among them Cornil, and Woodward, who in his history of the War of the Rebellion found no case of such a stricture either in the hospitals or upon the pension rolls. On the other hand Gibbs, Allingham, Kelsey, Cripps, and Castex all affirm just as positively that they have seen cases which dated from distinct attacks of dysentery; the author has seen 2 cases in which the patients ascribed the condition to attacks of dysentery, but in these the only proof of the disease consisted in the fact that they had suffered from pain and burning in the rectum, tenesmus, diarrhœa, and the discharge of blood and mucus, and such symptoms may be due to any inflammatory condition of the lower end of the intestinal canal. While it is probable that these patients did suffer from dysentery, inasmuch as they both came from Southern States in which the disease is very prevalent, and where the inhabitants are quite familiar with it, it is impossible to say positively that either of the strictures resulted from the dysentery itself. Certainly no case has thus far been discovered in which any of the typical bacteria to which dysentery has been ascribed have been found in the strictured area. While, therefore, the possibility and even the probability of dysenteric stricture is conceded, it must be admitted that the condition is not absolutely proved.

Irritating injections, habitual constipation, and pæderasty have been mentioned as causes leading to rectal inflammation, ulceration, and subsequent stricture. In the Medical and Surgical History of the War there are 4 cases of stricture of the rectum reported as resulting from gunshot wounds of this organ. In 2 other cases death occurred from the wound, but not until after a strictured condition had been discovered. Any cause, therefore, which results in the destruction of tissue, in inflammation of the submucosa, or the deeper tunics of the rectal or intestinal wall, may bring about a stricture.

Symptoms.—The symptoms of stricture may be divided into those of the latent, the ulcerative or inflammatory, and the obstructive periods.

Latent Period.—A certain number of classical writers deny or ignore this period entirely (Quénu and Hartmann, vol. vi, p. 297; Kelsey, p. 350; Allingham, p. 323; and Cripps, p. 235). In stricture due to malignant neoplasms the disease may exist for long periods before any marked symptoms will be noticed. There is also a latent period in strictures due to inflammatory conditions, either simple or specific. An injury occurs to the rectal wall through pressure of the head during labor, through surgical procedures or foreign bodies, and a small ulceration may develop which goes on for a certain length of time and finally heals. From this time forward the patient has no symptoms of rectal disease until months afterward he begins to notice increasing difficulty at stool,

and an examination shows a well-developed stricture constricting the caliber of the gut to a greater or less degree. This latent period is very common in syphilitic strictures and those following surgical operations. It is well illustrated in the case quoted from Cripps (p. 233), and in the stricture of large caliber described in the early part of this chapter. It also occurs in cases due to perirectal inflammations and pelvic cellulitis. In all these conditions the rectal symptoms in the beginning are entirely subordinate to those of the primary condition, and after the real cause of the stricture has been alleviated or removed there is a period in which the rectal symptoms are absent. It is that period between the acute inflammatory process and the time when the fibrous bands begin to obstruct the caliber of the gut by persistent contraction, which is called the "latent period," and in which no definite symptoms occur.

The ampulla of the rectum is a very wide and distensible cavity, and it requires a considerable amount of constriction to develop symptoms of obstruction in it. Until this degree of contraction has been developed, therefore, the symptoms of stricture may not manifest themselves at all. The symptoms of the latent period may be elicited by careful interrogation. The patient will generally admit that for considerable periods of time, or even dating the period back to that of the original disease, he has suffered more or less distinctly from heaviness, weight or aching in the rectum or sacral region, and pains shooting down the legs. Dysuria or frequent urination of a mild degree is often noticed at this time, and patients so affected have been treated for cystitis, urethritis, and stricture of the urethra, whereas the actual disease was in the rectum. Reflex disturbances of the uterine appendages, the digestive organs, and of the nervous system also occur in this period. It is well, therefore, to bear in mind its possibilities whenever there are obscure symptoms in patients who have suffered from rectal ulceration, pelvic cellulitis, uterine displacements, tuberculosis, or syphilis, and to examine from time to time to determine the possible development of stricture.

Ulcerative or Inflammatory Stage.—The symptoms of the ulcerative period previous to the formation of stricture differ in no wise from those described in the chapter upon General Ulceration of the Rectum. They consist in dull, constant pain in the perinaeum or sacral region, diarrhoea, tenesmus, discharges of mucus, blood, and pus, together with reflex disturbances of the genito-urinary and digestive organs.

These symptoms may entirely disappear and the patient feel perfectly well during the latent period of stricture formation, or they may pass gradually into those of stricture before the ulceration heals. As the causative ulceration heals, or the inflammatory tissue begins to con-

tract, the symptoms of diarrhoea subside, and difficulty in obtaining a movement grows more and more marked. At this period the reflex disturbances of the genito-urinary organs will increase, the rectal discharges will grow less, and while there will be tenesmus and frequent desire to go to stool, the act can only be accomplished with great straining.

Obstructive Period.—The symptoms of this period are the typical signs of the disease. They consist in gradually increasing and persistent constipation; from a simple irregularity the movements of the bowels gradually become less and less easy, until a faecal passage is not only a rarity but a real travail. Patients go one, two, five, ten, and even thirty-six days without having a movement, and then after straining, employing injections and instruments for breaking down the mass, a faecal explosion occurs, the intestines are cleaned out, and for another period they may be comparatively comfortable. One of the writer's patients devoted the Sabbath day to the movement of his bowels. The process required about two-thirds of the day, and recovery from the exhaustion occasioned by it took up the rest.

Godebert (*Thèses*, Paris, 1873, No. 496) relates a case in which the movement of the bowels only occurred once in a month or six weeks. It was then a veritable labor: purgatives had no effect; the stomach was much swollen, the appetite was lost, and the respirations very short. When the symptoms became so severe that the patient could bear them no longer, she retired to her chamber and with the finger introduced into the vagina, and straining with all her might, she was able to relieve herself little by little of the accumulated mass. The operation required the greater part of a day; the faeces at first were extremely hard and dry, but the later portion of the movement was soft and liquid.

The constipation in such cases is mechanical; it is an obstipation due to arrest of the faecal matter above the stricture. This arrest often results in irritation of the mucous membrane and increased secretion. Diarrhoea may therefore alternate with constipation, but what is more frequently the case, the patient suffers from a diarrhoea and constipation at the same time. There is a frequent discharge of mucus and semi-fluid matter, while there still remains above the stricture large masses of hard faecal matter. This condition is comparable to the dribbling of urine in enlarged prostates, in which the patient supposes that he suffers from incontinence when really it is from inability to empty his bladder. One must not always conclude that the bowels are being thoroughly emptied because of frequent diarrhoeal movements. The temptation to give opium or astringents in order to control such a diarrhoea should never be yielded to until one is absolutely sure that there is no accumulation of faeces above the strictured part.

Constipation, it should be remembered also, is a comparative term. Some require movements every day, while others equally as healthy require them only once in a week or more, as was the case in a patient who for forty years had a movement every Saturday night, and died from pneumonia at the ripe age of ninety-five years. Gradually increasing constipation, together with greater and greater effort to relieve one's self, are much more important symptoms than infrequent passages. With this one observes abdominal distention and accumulation of hard faecal masses in the intestine; above the brim of the pelvis, and all over the abdomen, in fact, one may frequently feel hard, lumpy faeces

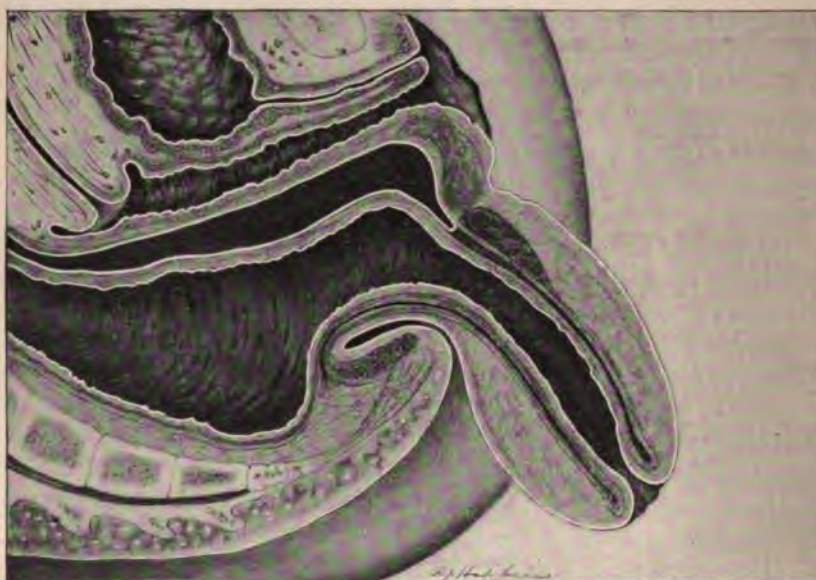


FIG. 167.—STRICTURE OF THE RECTUM CAUSING PROCIDENTIA.

through the distended abdominal wall. It is to these masses that is due the greatest danger in the disease. Stricture rarely if ever obliterates the lumen of the gut entirely, but foreign bodies, or hard, spherical masses of faeces frequently become lodged in the strictured portion and cause occlusion with rupture of the intestine and fatal peritonitis.

Intestinal indigestion, flatulence, and loss of appetite are common in this condition, and occasionally patients are seen who suffer from skin eruptions, fever, coated tongue, sallow complexion, jaundice, and all the complications of auto-intoxication due to the accumulation and decomposition of faecal matter above a stricture of the rectum or sigmoid.

The straining necessary to overcome the obstruction is often so severe that inguinal hernia may be produced, or, as in a case seen with

Dr. Ladinski (Fig. 167), it may result in prolapse of all the rectum below the stricture. In this case there was a history of progressive constipation but no evidence whatever of syphilis or of tuberculosis. Apparently it was a simple inflammatory process which had resulted in great hypertrophy of the rectal walls and the development of fibro-lipomatous tissue surrounding it. Hulke (*Med. Times and Gaz.*, London, 1879, p. 504) records a case of this kind, and also one in which complete prolapse of the uterus was brought on by this straining.

With the diarrhœa there are sometimes discharged large quantities of pus tinged with blood, and occasionally alarming hæmorrhages occur. These are due to the ulcerations above and below the stricture. The discharges from that below are not usually mixed with fæces, being purulent or sanio-purulent, and quite profuse; those from the ulcer above the stricture are mixed with fæces. Thus patients will describe being called to stool early in the morning and passing nothing but blood and pus; within an hour or two they attend the closet again and have a fæcal passage with some pus, and later in the day various calls result in passages similar to that of the morning.

The amount and character of the discharges from a stricture will depend largely upon its cause. In syphilitic stricture the discharge is very abundant, always sanious and dark-colored, and possesses a sort of feculent odor. In those due to tubercular or simple inflammation the discharges are not so abundant, they are not frequently mixed with blood, and the color is more of a creamy white stained with fæces.

Skin-tabs, such as the French call condyloma, excoriations, thinning of the perianal skin, and sometimes the development of papillomata around the anus, may form the external manifestations of stricture of the rectum. Henry Smith states that the skin-tabs and condylomata are more frequently found in syphilitic stricture than in any other variety, and that he had often made a diagnosis of this condition from the external appearances alone, and found his opinion corroborated by a more thorough examination.

The form of the fæcal passages has been insisted upon as an important symptom of stricture of the rectum. As such it has been greatly exaggerated. It is a perfectly clear mechanical principle that the fæcal mass must assume the form of the last constriction through which it passes; therefore it must take the shape of the anal aperture, and will not represent that of a stricture higher up. Grooved or tape-like fæcal masses are often full of import to the inexperienced, who suppose that they are always due to stricture, whereas they may be caused by spasmodic sphincters, hypertrophied skin-tabs, or hæmorrhoids. The only circumstances under which the fæces retain the shape of the stricture are when the latter is at the anus or is prolapsed so as to be outside

of this aperture. Kelsey was fortunate enough to see a case in which the faecal mass retained the form imparted by the stricture, owing to the fact that it prolapsed outside of the anus whenever the bowels moved. In Ladinski's case this was also clearly demonstrated, because the prolapse was constantly down, the stricture being at its lower end, and therefore the faecal mass always assumed the shape of the strictured caliber.

When the stricture is very low down, or at the margin of the anus, the parts assume a sort of inelastic, tubular condition, the sphincters lose their power of control, and the patient suffers from a condition of incontinence and constipation at the same time. The fluid substances constantly dribble away, whereas the formed faecal matter will be retained until great effort or solvent enemata result in its removal.

Dilatation and weakening of the gut wall above the stricture always occur, and cause danger of perforation or rupture. Tympanitic resonance is present over this area one day and an absolutely flat sound on another, owing to the periodic accumulation of faeces in, and emptying of this portion of the intestine. Perforation of this thin and weakened wall may occur without absolute obstruction, owing to ulceration or straining. In fact it most frequently occurs in this way. When it is preceded by obstruction the patient suffers from nausea, faecal vomiting, or great belching of foetid gases, together with intense pain and swelling of the abdomen, rapid pulse, and high temperature. After perforation occurs the temperature may suddenly drop for a few hours; if the patient does not die in this state of shock it will rise again, and the condition will develop into local or general peritonitis. While perforation ordinarily ends fatally this is not invariably the case, as timely operation may save the patient's life; or the area may become walled off and a localized abscess formed, which of course terminates in a faecal fistula.

Diagnosis.—In the diagnosis of stricture it is not only necessary to determine its existence, but also its seat, its pathological character, its extent, and the degree of constriction. When within 4 inches of the anus all this information can be obtained with comparative ease, inasmuch as the parts can be reached with the finger, can be seen through the speculum, and sections can be obtained for microscopic examination. Above this limit the diagnosis is more difficult.

The history and symptoms of the case will give valuable information as to the existence and probable pathological character of the stricture. Previous injury or operation, diffuse proctitis, pelvic cellulitis, a prolonged labor, the history of perirectal or pelvi-rectal abscess, syphilis, fistula, or rectal ulceration, may all suggest the probable existence of stricture, especially if associated with a gradually increasing difficulty

in movement of the bowels. A source of error in reading such symptoms lies in the fact that many patients, after having suffered from inflammatory conditions about the rectum and anus, develop the habit of irregularity in faecal movements. They learn to restrain themselves on account of the pain which stools occasion, and thus become accustomed to visiting the toilet only once in two or three days.

Constipation, such as would indicate stricture, consists in the requirement of great effort to secure a stool even though the desire for defecation is urgent. In cases of infrequent defecation simply due to habit, no unusual amount of straining or discomfort is required to accomplish the act. The symptoms may lead one to suspect stricture, but local examination alone can establish the diagnosis.

Examination.—The patient should be placed upon his side in the Sims's position with the hips flexed upon the abdomen and elevated upon pillows. The external appearance of the anus is frequently quite suggestive.

The existence of fistulous openings around the margin, especially if they are multiple and preceded by progressive constipation, is always suggestive of the probability of stricture. Where there is a discharge from the parts, the character and odor should be carefully observed; these have been described in connection with different varieties of ulceration, but the odor is of great importance in differential diagnosis, and may be referred to again. In cancer it is unique; once smelled it is never forgotten; it is neither faecal nor feculent, but a combination of putrefaction, gangrene, decomposing faeces, and rottenness to which no other bears any resemblance. In simple inflammatory or tubercular strictures the discharges may be comparatively odorless. In syphilitic stricture it is feculent, but if ordinary care is practised in the management of these cases the odor will be entirely subdued. In carcinoma, however, nothing short of the incinerating box of a crematory will destroy it. Aside from the odor, the discharges from carcinoma and syphilitic stricture resemble each other very much; they are both comparatively thin, bloody, and purulent.

In simple and syphilitic strictures the anus is ordinarily not much deformed; the fatty cushions around it remain comparatively intact. In malignant and tubercular strictures it is ordinarily sunken in, the fatty cushions around it are absorbed, and it presents a sort of infundibuliform appearance. In carcinoma the condition of the anus will depend largely upon the situation of the growth and the extent to which it has developed; if situated high up and it has not gone on to constitutional involvement, emaciation, and cachexia, the anus may give no indication whatever of the disease; if low down, however, the sphincter may be hypertrophied, hard, and spasmodic, and the seat of constant

pain in the early stages, but later the spasm gives place to great relaxation, dribbling of the discharges occurs, and exuberant, cauliflower-like growths may protrude from the anus.

The chief source of information in the diagnosis of stricture is examination by the finger. Great gentleness and caution should be exercised in such an examination, not only to avoid giving the patient pain and to prevent such a spasm of the sphincter as would interfere with complete examination, but because it is altogether possible to break down the soft and weakened tissues of the ulcerative portion and cause rupture with dangerous hæmorrhage or perforation of the peritonæum. Even with the utmost gentleness this has sometimes happened (*Bull. de la soc. de chir.*, Paris, October 23, 1872).

Upon the introduction of the finger into the anus the changes in the mucous membrane below the stricture which have been described may be observed. If the finger is pushed upward it may enter a gradually decreasing cone-like canal which leads to the stricture, or it may come upon a sudden decrease in the caliber of the gut formed either by soft granulations, smooth, hard, cicatricial tissue, or nodular, indurated, malignant masses. The gradual coarctation from below upward is usually associated with the tubular variety; the sudden and abrupt diminution in the caliber of the gut is due to an annular or sickle-shaped stricture. The sensation imparted to the finger by the touch of the stricture is very important. Many clinicians believe that they can positively diagnose malignancy by this, and certainly no one will deny that a surgeon of large experience can by this means alone obtain a fair knowledge of the condition. If hard and nodular and bulging out into the rectum, or broken down in its center and forming an irregular, crater-like ulcer with friable, exuberant granulations, one may assume with confidence that it is a case of malignant disease; if, on the other hand, the obstruction is comparatively smooth, hard, and contains only a few minute irregularities beneath the mucous membrane, is movable upon the sacrum and surrounding tissues, and apparently confined to the walls of the gut, it will probably belong to the inflammatory variety of stricture. In malignant stricture the diminution in the size of the gut is usually abrupt, whereas in the syphilitic type it is gradual. The latter are more frequently tubular than annular, whereas those of the simple inflammatory and tubercular type are ordinarily annular and involve only a small extent of the rectum. When the stricture is reached, one should never yield to the inclination to force his finger through the aperture, especially if it be a carcinomatous or ulcerative case. No good whatever can come from such a procedure, and there is always danger that what appears to be the caliber of the gut may possibly be the entrance into an ulcerative diverticulum, the dividing

tissue between which and the peritoneal cavity is so thin that perforation may easily result. As Malassez has pointed out, there is a portion of almost every stricture which is composed of a sort of proud flesh, soft and easily torn. Any undue force at this point may result disastrously.

The thickness and height to which a stricture extends may often be determined in females by the combined vaginal and rectal touch, which should never be omitted. In men who are not too fleshy, with one hand upon the abdomen and the other in the rectum one may sometimes grasp a tumor or a long stricture between them, and thus determine its extent upward. Under anæsthesia it is possible to grasp a tumor of the sigmoid between two fingers introduced into the rectum and the hand upon the abdomen; with the whole hand in the rectum this can always be done. In these examinations one should always determine the mobility of the affected parts; if the stricture is freely movable upon the sacrum and other organs of the pelvis, it will be much more favorable for operative interference than otherwise. Where it is attached to the sacrum, the prostate, the uterus, or other pelvic organs, the operation will be difficult and the prognosis grave.

When the symptoms indicate the existence of a stricture and it can not be made out by digital examination, search by instruments will often succeed, but it must be remembered that instrumental exploration is exceedingly dangerous in stricture. A rectal bougie, however soft and flexible, may do great damage in the hands of the inexperienced. There are so many sources of error in examination by this instrument that little weight is attached to it as a diagnostic means. It may be caught in the mucous folds or in a diverticulum of the rectum and absolutely fail to pass beyond this (Fig. 168); at the promontory of the sacrum it may be arrested, and, owing to the acute flexure of the sigmoid upon the rectum, may double upon itself, coming backward into the rectal ampulla instead of passing into the sigmoid flexure; sometimes, even if the operator is skilful enough to appreciate when it is thus doubling upon itself,

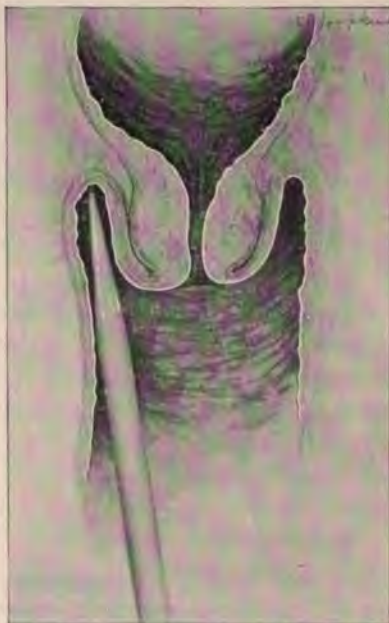


FIG. 168.—BOUGIE ARRESTED IN DIVERTICULUM SURROUNDING A STRICTURE.

he will be unable to introduce it any farther. A bougie which is stiff enough not to double upon itself is also stiff enough to penetrate a diseased rectal wall. Soft Wales bougies may be used by experienced hands in these cases, but even they are dangerous. The author has several times had these instruments introduced into the rectum, when operating for abdominal conditions, just to observe the amount of pressure exercised by them upon the intestinal wall, and from these experiments he is exceedingly skeptical in regard to the wisdom of ever introducing them into chronic, inflamed intestines with symptoms of stricture. Certainly no one who has ever seen the amount of pressure that is exercised upon the gut wall by one of these instruments will take the chances of attempting to force one through a strictured intestine in which there is ulceration. Aside from this danger, the bougie reveals nothing definite with regard to stricture. If it fails to pass, one can not say whether the obstruction is due to this or to some other cause; if it passes, one can not say there is no stricture, for, as Kelsey says, "a bougie of good size will often pass a stricture small enough to produce great trouble" (*op. cit.*, p. 357).

One may sometimes use it to advantage through the proctoscope by bringing the strictural opening into sight and introducing the bougie through it. Otherwise one works in the dark when they are used.



FIG. 169.—BODENHAMER'S BULBOUS RECTAL BOUGIE.

The reader should also be warned against the danger of introducing rectal instruments into patients under the influence of anæsthetics; the only guide there is in regard to the amount of traumatism that is being produced lies in the sensations of the patient, and one may perforate the intestine unconsciously if this safeguard is removed. The pneumatic proctoscope gives much more information than the bougie and is not nearly so dangerous; through it one is able not only to diagnose

the stricture and its location, but often its caliber and pathological nature as well. The condition of the parts below the stricture can be seen, and if the obstruction consists in neoplasms, such as polyps or papillomata, this can also be determined. The great value of this instrument is enhanced by the fact that there is practically no danger in its use.

It is introduced through the internal sphincter, and the gut is inflated so that one can see clearly every inch of the way before advancing

the instrument. . When no stricture exists in the rectum itself, a few pressures upon the hand-bulb will dilate the organ, and the tube can then be advanced, its end always being clearly in view, out of touch with the rectal wall. At the juncture of the rectum and sigmoid the direction of the gut above can be seen, and with skilful manipulation the tube can be carried into the latter just as safely as into the rectum. By this means it is possible to bring into view any contracted or strictured portion of the gut without any undue pressure or danger of perforation. After this has been done and the end of the tube accurately adjusted to its aperture, the external cap may be removed, and a properly adjusted bulbous bougie (Fig. 169) passed through the stricture to determine its caliber and extent. These instruments and their uses have been already described (p. 129).

Rectometers.—Laugier and Tarnier have each invented instruments which have dilating ends, and which may be introduced through the stricture and then dilated and allowed to collapse gradually until they can be easily withdrawn, on the same principle as an Otis urethrometer. The author having had no experience with them, is unable to confirm or deny their usefulness.

In the absence of the proctoscope, or where for any reason it can not be applied, one may have resort to Simon's method of introducing the whole hand into the rectum and examine the parts in this way. It is a very dangerous procedure, however, where there is chronic inflammation of the organ.

Laparotomy.—As a final resort in the diagnosis of stricture one may have recourse to exploratory laparotomy. Formerly such a radical measure would have been looked upon unfavorably; to-day, however, it is a most common procedure, and comparatively without danger. Indeed, it is less dangerous than any instrumental examination of the rectum in diseased conditions, if the use of the pneumatic proctoscope be excepted.

In making such an examination the incision should always be made similar to that employed for inguinal colostomy in order that an artificial anus may be made at the time if it is found necessary. Moreover, this incision will be found the most convenient for operations upon the sigmoid flexure and upper end of the rectum. After the incision has been made, the sigmoid may be gently dragged out of the opening or run through the fingers until the strictured area or neoplasm is felt or found absent.

The diagnosis between the several varieties of stricture is somewhat more difficult; but the most important distinction to be made is that between the malignant and non-malignant. In a general way one may distinguish them as follows:

MALIGNANT STRICTURE

Generally occurs in persons above thirty-five years of age.

Runs its course ordinarily in two or three years. Constitutional symptoms, such as loss of flesh and strength, appear early in the disease.

Hereditary influence probable.

To the touch hard, nodular, without pedicle; protrudes into the rectum from more or less of the circumference of the gut, but not equably; it may occur as a deep excavating ulcer with sharp edges and indurated base, or sometimes as a fungous, granulating, cauliflower growth. May be movable, but is generally attached to the sacrum and surrounding parts.

The odor is nauseating, gangrenous, and unique.

NON-MALIGNANT STRICTURE

Occurs at any age, ordinarily between twenty and fifty.

The patients may live for many years with it. General health remains good through long periods.

No hereditary connections.

To the touch it is smooth, hard, and inelastic, but not nodular.

Rarely attached to the sacrum, but sometimes attached to organs in the anterior portion of the pelvis.

The discharge may be abundant or limited, thick or thin, according to the nature of the stricture.

The odor is faecal or feculent, according to the amount of ulceration.

A distinct cicatricial or fibrous appearance upon examination through the speculum.

In doubtful conditions microscopic examination of an excised portion of the growth will be of service, but one should not rely too implicitly upon it, especially if the result of the examination is negative. The author had one case in which three specimens removed from a neoplasm of the rectum were reported as non-malignant by three different microscopists; so convinced was he of the clinical diagnosis which had been confirmed by two other surgeons that he advised radical operation, to which the patient consented. After the tumor was removed more thorough examinations of its deeper portions revealed clearly its carcinomatous nature. Hypertrophy of the other tissues, tubules, and glands in the rectum may occur as a result of irritation from a neoplasm, and the sections obtained for examination (during life) may be only portions of these hypertrophied areas, and not a part of the malignant disease at all. Between a careful, thorough clinical diagnosis and a microscopic examination of a small specimen the former seems more reliable, though the value of the latter is not to be underrated.

Between the varieties of inflammatory stricture differentiation is much more difficult. Reference has been made to the microscopic appearances, the changes in the blood-vessels, the deposit of tubercles, and the development of fibrous tissue which occur in the three different varieties, but unfortunately such examinations can only be made after the stricture has been removed. What is needed is some method to

distinguish the different varieties in the early examinations in order to determine positively the line of treatment most applicable to any given case.

Those symptoms upon which most reliance is placed are the following: Syphilitic strictures are rarely abrupt, they show a gradual funnel-like contraction, and around the edges of the ulcers there is a bluish-white cicatrization.

The traumatic or simple inflammatory stricture is usually abrupt and may be limited to one side of the gut as a falciform contraction; it is generally smooth, covered with epithelium, and in the majority of instances is near the anus. Tubercular stricture may occur at any portion of the large intestine; it is always associated with tubercular ulcers and caseating tubercular masses, and the scrapings from such an ulcer will generally show the presence of tubercle bacilli and giant-cells. The appearance of the ulcer is entirely different from that of the syphilitic ulcer, as has been described in the chapters upon these two diseases. The mucous membrane is always undermined and the base elevated, whereas in the syphilitic ulcer the edges are never undermined and the base is always crater-like or excavated.

While the therapeutic test is of little value to determine the nature of the stricture, it is of the greatest importance in that it checks the extension and assists in healing an ulceration if it be specific. Not only this, but it acts as a real alterative and tonic in cases due to tuberculosis and simple inflammation.

Microscopic and culture tests throw light upon tubercular strictures, but the finding of tubercle bacilli should not be taken as an absolute proof of the tubercular nature of a stricture, because these germs may be ingested, carried through the intestinal tract, and thus enter the discharges or lodge upon the ulcerations without being the cause of the same. The appearance of the ulceration below the stricture, the sensation imparted to the finger in digital examination, the history of the case, and above all the concomitant symptoms, such as pulmonary tuberculosis or syphilitic manifestations elsewhere, are the important points in differentiation.

Treatment.—Recognizing the fact that strictures are all due to inflammatory processes, it is conceivable that proper treatment in the early stages may prevent their formation. The theory upon which gradual dilatation has succeeded in curing a certain number of acute strictures of the urethra is that it squeezes the blood out of the strictured area, and when the instrument is withdrawn there results a state of arterial hyperæmia which results in absorption of the newly formed tissue. During the early stages of stricture the blood-vessels remain intact, and are not materially diminished in number; the plastic deposit

is soft and absorbable. Similar treatment may therefore be as successful here as in the urethra. If the inflammatory process is syphilitic, proper medication, along with local treatment, will control it and check the cellular infiltration which results in stricture. If it is due to tuberculosis, the administration of proper remedies and forced feeding, together with local applications, may limit the extent of the ulcer as well as the fibrous deposit around it, and thus control to a certain degree the extent of the stricture. If it is due to simple infection, careful antiseptic treatment may often prevent the formation of a cicatrix or stricture. When once a dense, hard, fibrous stricture has formed, the blood-vessels are no longer normal in their caliber or number, and the probability of exciting an absorptive hyperæmia is exceedingly remote; this stage once reached there is no method that offers any certain hope of permanent cure.

Dietary and Medicinal Treatment.—The patient should be placed upon a nourishing but non-irritating diet. A milk diet produces a hard, leathery, insoluble stool; while it is non-irritating in the stomach and upper intestine it is far from being so in the sigmoid flexure and rectum, and it is particularly dangerous in stricture.

As a rule a nitrogenous is preferable to a carbohydrate diet, but when there is no marked colitis this need not be insisted upon. A mixed diet, consisting of chopped meats, soups, rice, hominy, ice-cream, fruits, chocolate, fish, oysters, etc., may be allowed; with these a liberal amount of cod-liver oil or olive-oil should be given. Where there is marked ulceration rest in bed is always advisable; but one must be careful not to carry this too far and develop general debility by long confinement and lack of exercise.

Where diet does not produce a regular movement of the bowels it will be necessary to resort to some laxative. Strong purgatives are to be avoided, inasmuch as they not only produce irritation and œdema, which narrow the passage, but they may through excessive peristalsis and tenesmus cause a rupture of the thin gut above the stricture. For these cases there is nothing better than small doses of Epsom salts with bicarbonate of soda in the proportion of three to one; the saline mineral waters are also useful, but patients are very likely to develop the habit of taking them in too large quantities, and thus induce a diarrhœa rather than a normal movement. Castor-oil, cascara sagrada, glycerin, and licorice powder may also be used with advantage. It is advisable in the majority of cases to alternate these different remedies. The resinous cathartics, such as gamboge, aloes, podophyllin, and senna should be avoided. Enemata, if properly administered, are of benefit, but the practice of introducing them through long tubes is not only dangerous but useless. If the tube is stiff perforation may be easily produced; if it

is very limber it will pass up to the stricture, double upon itself, and thus the fluid will be poured out into the rectal cavity just as it would have been had the small nozzle of a syringe been used. It is better in these cases to advise the patient to take cold-water enemata from a fountain syringe raised about 2 feet above the bed or floor on which he lies. He should be in the knee-chest posture and allow the fluid to flow in slowly. The cold water will temporarily contract the blood-vessels, reduce the congestion, and thus increase the caliber of the strictured portion for the time being. The slight elevation of the syringe will obviate any danger from pressure, and the slow, gentle current will not excite any immediate peristalsis. As much as 2 or 3 pints of cold water may be introduced in this manner, and often with the happiest results. Occasionally 4 ounces of olive-oil may be injected about half an hour before the enema is given. This lubricates the parts, and sometimes produces a smooth, comfortable movement of the bowels without the enema. Glycerin, turpentine, and salt may be added to the cold enema, and will sometimes be of material assistance to excite peristaltic action and proper faecal movements.

Diarrhoea connected with a stricture of the rectum is generally due to one of two causes, viz., an impaction of faeces above the strictured point or an acute ulceration of the intestine. The management of this condition, therefore, consists in the removal of any faecal masses which may be retained above the stricture and treatment of the ulceration. The injections of oil, solutions of ox-gall, and warm water may result in the softening and removal of the arrested materials. When this has been accomplished then the ulceration can be treated, as has been described in the chapter on that subject.

Kelsey states that acute obstruction sometimes occurs in these cases as a result of the spasmodic contraction and excessive peristalsis, and claims (*op. cit.*, p. 362) that several times he has been able to obtain a movement, in apparent obstruction due to stricture, by the administration of large doses of opium. Although with no experience of this kind, the author would certainly hesitate to administer very large doses of this drug to patients who are suffering from symptoms of obstruction unless there was great tenesmus, griping, and pain. Medicines, as a rule, do little more than relieve the symptoms in the majority of cases, and yet one would be very far from justified in omitting their use. Especially is this true with regard to antisyphilitic remedies. Mercury and the iodides have a positive influence in promoting the resolution of all embryonic fibrous material, as Stillé pointed out many years since in his lecture upon plastic adhesions of the pleura. Mercury when administered in moderate doses has been shown by Keyes to have a positive tonic influence, to increase the red blood-corpuscles, and conduce to

the patient's general health. Therefore these drugs may act in a beneficial way in non-specific as well as specific strictures.

LOCAL AND OPERATIVE TREATMENT

The chief local and operative methods used in the treatment of stricture are:

Dilatation or divulsion; proctotomy; excision; entero-anastomosis; colostomy; electrolysis.

Theoretically the ulceration should always be healed before any surgical treatment is begun in order to avoid sepsis, but practically this is impossible, for in many instances the ulcers can not be cured so long as the stricture exists. Antiseptic precautions should always be taken before any local or operative treatment of the stricture is begun, whether it be dilatation, proctotomy, or excision.

Gradual Dilatation.—This method is that most generally employed throughout the surgical world, notwithstanding the fact that it is not often curative and entails periodic repetition throughout life. It is carried out by the aid of bougies and rectal dilators of various types; it requires a considerable amount of skill and judgment, and it is fraught with danger even in the most skilful hands.

Bougies.—There has been devised a large variety of rectal bougies, some of them useful and many of them positively detrimental. Those of Wales, Credé, Andrews, and Hegar (Figs. 81 and 170) comprise the



FIG. 170.—CREDÉ'S RECTAL BOUGIE.

most useful ones for the treatment of rectal stricture. The old conical rectal bougie made of woven linen or silk and covered with shellac, is a most

dangerous instrument and no longer used by rectal surgeons. The methods of introducing the bougies, however, are of more importance than the instruments themselves. The dangers of traumatism and perforation of the rectal wall from the use of stiff instruments have already been described.

The Wales instruments were devised to obviate this danger, and they are superior to other instruments in this respect.

Methods of Introduction.—The patient is laid upon the side in the Sims's posture with the thighs flexed upon the abdomen. The bougie is then gently introduced, if practicable using the left index finger to guide its tip into the orifice of the stricture. In the majority of cases this is impracticable, as the sphincter will not admit the passage of the finger and the bougie at the same time without great pain. When the bougie is arrested, a current of water is injected through it in

order to lift out of its way any folds of mucous membrane or other obstruction.

If the stricture is at the margin of the anus or within an inch of the same, it is an easy matter to introduce the instrument, but if it is higher up it is always a matter of chance whether it enters the strictured canal or not. In stricture above the levator ani there is generally a sagging or procidentia of the constricted portion of the gut into that below, thus forming a sort of *cul-de-sac* around it. The end of the bougie is very likely to be arrested in this instead of entering the strictured aperture (Fig. 168). Especially is this the case in malignant and annular strictures, where the orifice may be in the center or at any other portion of the circumference. In syphilitic strictures, in which the approach to the orifice is funnel-shaped and gradual, this accident is not so likely to occur. At any rate, it is always a matter of uncertainty when the bougie is arrested whether its tip is engaged in the stricture, in this sulcus, or in a mucous fold, and in diseased conditions any exercise of force at such points, even with these soft instruments, may result disastrously.

The Author's Method of introducing Bougies into Strictures.—In order to obviate these dangers and be more accurate in the use of the instruments, the author has for several years been in the habit of introducing a proctoscope up to the point of the stricture and locating its end over the aperture; the bougie is then gently introduced through it into the stricture. By this means it is known that the bougie is in the right track; the proper size can be easily selected, and it may be gently pushed upward with or without the use of a stream of water and without any doubt of its being in the right track. The bougie which is used for this purpose is a Wales instrument with no flange upon its end, so that the speculum can be removed as soon as the former is engaged in the stricture. It is best to introduce a small instrument first, pass it through the stricture, and then introduce one size after another until the largest one which can be passed without actual pain has been reached. When this has been done, the speculum is withdrawn and the bougie allowed to remain in position for five to fifteen minutes. By this means not only is the bougie accurately introduced into the orifice of the stricture, but it is possible to see the condition of affairs at each introduction, and also to realize how much of the friction and grasping of the bougie is due to the stricture itself as distinguished from that of the external sphincter muscle. The method is simple, accurate, practical, and far superior to the old uncertain methods.

The application of remedies to the stricture at the time of dilatation was first employed by Dessault, who introduced a tampon incorporated with mercury through the constriction and left it there.

This method is of no practical value, but in cases where there is ulceration, the bougie may be lubricated with such ointments as may be thought beneficial to the condition. The author has sometimes used an iodoform ointment in the strength of 1 dram to the ounce, and sometimes a mercuric ointment; but of recent years he finds it more satisfactory to use a simple lubricant upon the instruments, and depend upon more accurate methods in the application of drugs to the ulcerated areas.

The frequency with which the bougie should be introduced depends upon the amount of reaction occasioned. At first it may be advisable to introduce it every day, provided the patient's anus and rectum do not become inflamed and tender from the proceeding. Often it will be found necessary to allow several days to intervene between *séances*. Any haste in this regard may result in the development of acute inflammatory conditions which will not only retard the final result, but increase the stenosis and add a real danger to the condition. It may be set down as a rule, therefore, that wherever the bougie produces any tenderness or considerable pain it should not be introduced again until all this has passed away. Too rapid increase in the size of the instruments may also produce this effect. One should never introduce more than three bougies at one sitting; he should keep a record of the sizes used, and always begin with one number lower than the largest used at the previous treatment; if this passes easily and without pain, he may then introduce the highest number used on the previous day, and if it passes freely, introduce one size larger. Before removing the instrument a warm solution of boric acid is injected through it, and thus everything above the stricture is cleansed as far as possible.

The patient should be kept quiet for half an hour after the treatment, and if any bleeding follows the withdrawal of the instrument he should not be allowed to leave the office until his rectum has been examined, to ascertain if any considerable hæmorrhage is taking place, and if necessary control it.

Retention of Bougies.—The length of time a bougie should remain in the stricture after it has once been introduced is a somewhat mooted question. Kelsey (*op. cit.*, p. 353) claims that it is advantageous to allow the instrument to remain in the stricture several hours, or even through the night. Credé (*Archiv für klin. Chir.*, 1892, S. 175) says that the bougie should be left in position as long as it is grasped by the sphincteric contraction of the circular fibers, and that having been once introduced it should be retained until it comes away without any friction or effort upon the part of the surgeon. Keyes, however, believes in rapidly increasing the size of the dilating instrument, and in introducing a bougie with considerable force in order to accomplish this.

Ball (*op. cit.*, p. 173) maintains that the length of time which the bougie should remain depends largely upon the character of the stricture. In dense, hard, cicatricial strictures he believes in allowing the instrument to remain *in situ* for several hours; while in soft, flexible ones he advises not only the use of comparatively small instruments, but their immediate removal after having passed through the strictured area. MacMaster (N. Y. Med. Jour., 1876, p. 376) and Quénu and Hartmann (*op. cit.*, p. 311) are advocates of the immediate removal of the bougie after it has once passed the stricture. The rule is as we have stated above, but occasionally, where the stricture is very tight, having once succeeded in introducing the bougie, it may be allowed to remain for considerable periods of time, even for twenty-four hours, in order that its pressure may gradually soften the stricture, and by pressure upon the parts reduce the congestion and œdema which narrow the orifice. In strictures of moderately large caliber there is no advantage in maintaining the bougie in position longer than is necessary to overcome whatever spasm it excites.

Aside from bougies, numerous ingenious instruments have been devised for the dilatation of stricture. Among them are sponge, tupelo, and laminaria tents that have metallic tubes running through their centers in order to facilitate the escape of gas. These are introduced through the stricture and held in position by tampons until the moisture of the bowel causes them to swell and gradually dilate the stricture. They are dangerous instruments, however, inasmuch as there is no means of gauging the amount of pressure which they exert upon the weakened and sometimes friable intestinal walls. The points at which stricture is generally located are very slightly sensitive to pain, and laceration or even rupture of the gut may result without the patient being aware that the injury has taken place. Such instruments are therefore inadvisable.

Others, such as hollow dilating bougies made of soft rubber and arranged so as to be dilated by the injection of water or air after they are passed through the stricture, have been advised by various surgeons. Ball says that the ordinary Barnes's dilators are superior to any of these devices; he has used them a number of times for the dilatation of stricture, and with excellent results; they are of hour-glass shape, and, after they have been once introduced and distended, they will remain *in situ* as long as is necessary. Where the stricture is within the lower 3 inches of the gut,



FIG. 171.—SIMS'S
RECTAL DILATOR.

the author is in the habit of using the simple, old-fashioned Cusco's speculum for dilatation. It is easy of introduction and very effectual for this purpose.

Rectal dilators of various patterns have been devised for the treatment of stricture, the best known of which are Sims's (Fig. 171), Mathews's, Nélaton's, and Durham's (Fig. 172). Recently Martin, of Cleveland,

has introduced one which he calls a "coactor." There is no doubt that in experienced hands these instruments sometimes prove superior to the use of the bougie to obtain rapid results. The friction and pressure necessary to dilate a stricture by the use of bougies may result in dragging and tearing of the tissues, whereas the rectal dilators may be introduced through the stricture and gradually widened, thus avoiding any friction. The danger of these instruments is in our inability to estimate how much pressure is being exerted upon the rectal wall; there is no means to determine when laceration or rupture is about to occur, and after it has once taken place the damages can rarely be repaired. Such instruments should never be used except in the hands of operators familiar with the amount of pressure which they exert, and having a knowledge of the friability of the different classes of stricture. On the whole one must conclude that the bougie properly used is the safest and most satisfactory instrument for gradual dilatation.



FIG. 172.—DURHAM'S RECTAL DILATOR.

Rapid Dilatation or Divulsion.—

This method, so popular at one time in strictures of both the rectum and urethra, has practically and justly become obsolete. Mathews still employs it in constrictions following operative interference at the anus or very low in the rectum. At this point the method may be employed, and no doubt one will obtain some very rapid and excellent results, especially if bougies are passed regularly thereafter to maintain the dilatation.

The operation consists in a rapid distention of a fibrous or cicatricial tube which is often friable and easily torn. When such distention takes place, a rupture either complete or partial is the inevitable result, and it is impossible to tell in which direction, where, and to what extent this will occur. Naturally the anterior and lateral portions of the rectum being the thinnest and least protected will ordinarily be the site of the injury, and this being in the neighborhood of the peritoneal cavity adds a double hazard to the operation; hæmorrhage, peritonitis, infection, and abscess are the natural sequences of such an accident. They have all been observed by Trelat (*Jour. de la soc. de chir.*, Paris, 1872, p. 573) (*ibid.*, p. 450, and *Jour. de la soc. anat.*, 1872, p. 400) and death has not infrequently resulted either from immediate shock or subsequent complications. The stretching of the stricture is done either with the fingers or with specially devised instruments, such as the dilators mentioned above.

The operation has nothing whatever to recommend it, save that it produces an immediate increase in the caliber of the stricture, but it does so at such risks that the end can not justify the means. Moreover, these ends may be accomplished by simpler and less dangerous methods.

Electrolysis, Cauterization, and Raclage.—For a number of years there have been frequent reports of strictures of the rectum treated by electrolysis. Le Fort (*Gaz. des hôpitaux*, Paris, 1873, p. 221) has recorded a number of cases, originating a method by which he claims to have obtained radical cures. His method consists in the introduction of an electrode shaped like a rectal bougie. It is insulated except near its end, where there is a metallic contact through which the electric current passes. The instrument is introduced until this metallic area is brought within the grasp of the sphincter, and then with the negative pole attached to it and the positive pole held in the patient's palm, or attached to some other portion of his body, a mild galvanic current is turned on and allowed to flow for considerable periods of time. In some cases the instrument is allowed to remain in overnight, and the author claims to have obtained most satisfactory results. Newman (*Jour. Amer. Med. Ass'n*, 1891, p. 701) describes another method of applying this principle; he claims to have first used it in 1871. It was also used by Beard in 1874 (*Archives of Electricity and Neurology*, vol. i, p. 98), who described the process of decomposing a compound body by electricity, and claimed to obtain a "galvanic chemical absorption" of the stricture. Newman's electrode consists in a metallic tip fastened to an insulated stem. The shape of the tip may be cylindrical or olive, from $\frac{1}{4}$ of an inch to $1\frac{1}{4}$ inch in length, and from $1\frac{1}{8}$ to 3 inches in circumference.

The patient is placed in the Sims's position; the positive pole is

grasped in the palm of the hand or placed upon the abdomen; the rectal electrode is then introduced up to the stricture and engaged in its orifice, and the current of from 5 to 20 milliampères is turned on. With ordinary pressure he claimed that within five to fifteen minutes the bougie will gradually pass through the stricture without any rupture or abrasion of its surface. He reported 12 cases in which dilatation and other methods had been tried without avail, and claimed to have cured 9, the other 3 having been improved. In 1 case in which the method was used, he states that he had the opportunity of making a post-mortem examination some years afterward and found no evidence whatever of stricture; he advises the application of the current about once in two weeks. The claims for this method have been frankly stated, but having tried it in urethral strictures and found no benefit therefrom, the author sees no reason to believe that it will cure those of the rectum.

Proctotomy.—This operation is the one generally recommended in rectal stricture. It consists in partial or complete section of the stricture. It is described in the text-books as internal and external proctotomy. The term external, however, is misleading, inasmuch as the incision is not made from the outside, but simply extends from the upper limits of the stricture downward through the rectum, anus, and post-anal structures. It is better to describe the two operations as partial proctotomy and complete proctotomy.

Internal or Partial Proctotomy.—This operation consists in cutting or nicking the stricture with the view of facilitating dilatation by bougies or other instruments. The first mention of this operation is that by Stafford (London Med. Gaz., 1834, p. 607). The operation is comparable to that of internal urethrotomy, and is performed by incising the stricture with a blunt-pointed bistoury, or with some specially devised instrument similar to the urethrotome of Civiale or Otis.

The stricture may be cut deeply in the posterior region, or it may be simply nicked at different points around its circumference. The operation is a very dangerous one, especially when the stricture is situated at some distance from the anus. Hæmorrhage is a possibility, although there has been no fatal occurrence from this accident; the danger lies in infection, sepsis, and diffuse periproctitis. It is unnecessary to enlarge upon the possibilities and probabilities of infection from an imperfectly drained wound well up within the rectum where there are always numerous bacteria present; the accidents which have followed this operation and the false principle upon which it is based have rendered the procedure practically obsolete. There are occasional cases of valvular or falciform strictures situated at a distance from the anus in which it may be justified, especially if done with some of the modern appliances, such as the Pennington clip or hysterectomy forceps. In

such cases the clip or forceps is applied over the valve-like stricture and made to grasp as much of the tissue as possible; it remains on until it cuts its way through, thus widening the caliber of the gut. It requires from five to six days for this to be accomplished, but there is little danger of hæmorrhage or sepsis by either of these methods.

Where the stricture is tubular, or involves any extent in the length of the gut, these procedures will, of course, be impracticable. Internal proctotomy by simple incision is no longer countenanced by operative surgeons, for the slight benefits derived from it are out of all proportion to the dangers incurred; therefore it need not be discussed further.

Complete Proctotomy.—This operation, called also linear posterior and external proctotomy, consists in an incision in the posterior median line of the rectum extending from the upper limits of the stricture down through the anus and tissues posterior to it. The operation was technically first devised by Humphreys (*Ass'n Med. Jour.*, London, 1856, p. 21), although, as Quénu and Hartmann say, it had been done practically many years before in operations upon fistulas associated with stricture. To Humphreys, however, belongs the credit of establishing the operation as a procedure of choice.

In the early operations by this method the chain écraseur or the actual cautery was used to incise the parts. Both of these methods were useful in that they avoided hæmorrhage; but the fact that they are both followed with denser cicatrization than simple incision, and that the methods of controlling hæmorrhage are so complete that it no longer gives any great anxiety, have rendered the use of these instruments unnecessary. The operation is performed by introducing a blunt-pointed bistoury through the stricture and cutting downward and backward in the median line through all the walls of the intestine, through the internal and external sphincter out into the skin. It is most important that the incision through the sphincters and skin should extend backward to the tip of the coccyx in order that there shall be no possible point for lodgment of fæcal matters and purulent discharges. The dangers of incontinence from this operation have been greatly exaggerated. It will be remembered that only a few of the fibers of the external sphincter around the very margin of the anus are circular, and that those which extend backward and are attached to the coccyx do not decussate; therefore, an incision in this line will not sever many of the muscular fibers, but simply separate them and not destroy their contractile power. Occasionally where a large cicatrix is formed, separating the ends of the internal sphincter, a certain amount of incontinence may result, but this is rare. At any rate, the incontinence which follows this operation is not comparable to the discomforts and dangers of a stricture, and therefore the patient must submit to the lesser evil. On account

of the time required for the parts to heal, Weir suggested that the incision be made through the stricture and down into the hollow of the sacrum, from which point a drainage-tube is carried out through the skin and the post-anal tissues without incising the sphincters. Kelsey states that he has tried this in several cases, with the result of saving much time. "The tube should be left in until all danger of periproctitis has passed. If there is no rise of temperature by the fourth day, it may be safely removed, and the wound caused by it will generally heal promptly." It seems improbable that this operation would end otherwise than in a fistula, which would eventually have to be cut—the very proceeding which it is intended to obviate.

Another method of hastening the healing of the lower end of the wound consists in freshening the surfaces and drawing the edges together by deep sutures after granulation has once begun. Both of these methods are based upon theory. The fact is, the external wound nearly always heals before the internal, and it is difficult to keep it sufficiently open to secure proper drainage. Moreover, as the after-treatment consists in persistent, thorough dilatation, it is perfectly plain that any attempt to suture the anal wound together would not only be useless but cruel to the patient. No effort should be made to narrow the external outlet until the stricture has been obliterated, and until the wound or ulceration about it has completely healed. The dangers in this operation as in internal proctotomy, are sepsis, periproctitis, and hæmorrhage. As said before, the hæmorrhage can be easily controlled by packing with gauze or charpie; the sepsis and periproctitis must be avoided by thorough antisepsis before the operation and complete drainage afterward. It is well, after having incised the stricture and packed the wound, to carry a large-sized drainage-tube into the gut above and fasten it in this position so that gas and fluid faecal matter will not accumulate and force the packing out of position.

The after-treatment of complete posterior proctotomy consists in thorough antiseptic irrigation, followed by dilatation and loose packing of the wound with iodoform or sterilized gauze. In these cases, as has been said in fistula, great harm can be done by packing the wound too tightly; simply introduce enough gauze into the incision to protect it from faecal matter and to absorb its discharges. Of course this does not apply to the original packing for the control of hæmorrhage, which should be introduced very firmly into the wound. The operation is not applicable or advisable in cases of malignant stricture, although some authorities believe that the patient's condition may be benefited by incising a stricture even of this character.

The possibility of there being two or more strictures, one above the other (Fig. 173), should always be remembered, and the operation should

not be concluded until one is able to introduce a full-sized bougie well into the sigmoid flexure.

This operation, considered so simple and without danger, is said by most authorities to give excellent results. In the author's experience the results have not been uniform or satisfactory; notwithstanding complete incision, there has been no marked case of incontinence, but recurrence of the stricture has been the invariable rule. This observation is in keeping with those of the statistics taken from the thesis of Lachowski (Paris, 1894-'95). In 32 observations the results were as follows: Three immediate deaths from erysipelas; 4 deaths within four years from cachexia or phthisis; 21 recurrences, 9 of which occurred during the first year and 4 during the second year; and 3 invalids were lost sight of. Only 1 case out of the 32 is noted as absolutely cured (Verneuil). Protracted ulceration and recurrence of the strictures, together with more or less incontinence of fæces, were the results in a large majority of cases.



FIG. 173.—MULTIPLE STRICTURE OF THE RECTUM.

Bullard (*op. cit.*) states that he has rarely failed to obtain a complete cure by this method of treatment. Kelsey also claims to have had the most satisfactory results. The English surgeons, Cripps, Allingham, and Ball, all speak highly of the method; and so far as obtaining an immediate enlargement of the rectal caliber, allowing the free passage of fæces, and giving to the patient relief from symptoms of obstruction are concerned, the operation is satisfactory; but in the author's experience, the only permanent cures by it have been in a few cases of annular or falciform contraction low down in the rectum.

It should be borne in mind that in certain cases where fistulous tracts extend around the stricture, opening above it into the rectum, and below either upon the skin or into the anus, these tracts may be laid freely open, and thus the stricture incised without doing posterior proctotomy. The more incisions that are made the more likelihood will there be of sepsis; nevertheless, all the fistulous tracts and burrowings should be laid open, and the parts protected as well as possi-

ble by antiseptic dressings and frequent irrigations. When these precautions are carried out, there is not a great deal of danger of sepsis, and cases of erysipelas and diffuse periproctitis are seldom seen. The objections to the operation, however, remain: recurrence is rapid and frequent, there is a certain amount of incontinence for an indefinite period of time, healing is slow, and the patient can never expect to discontinue the use of some dilating instrument. (Lachowski, Carré, Quénu and Hartmann.)

Where the stricture is very tight, the operation is sometimes done in two steps, first dividing the sphincters and the rectal wall up to the stricture, and checking the hæmorrhage in these parts. Later the stricture itself is incised by the introduction of a grooved sound for a guide to the bistoury where it is impossible to introduce the finger for this purpose. This is simply a matter of detail, however, and while it may be a wise precaution it is not necessary.

Excision.—As far back as 1825 Lisfranc excised the rectum for stricture. The reports of these cases by Carré (Thesis, 1893) clearly indicate the inflammatory or syphilitic nature of two of them which were supposed to have been carcinomatous. Glaeser (*Archiv f. klin. Chir.*, 1867-'68, Bd. ix, p. 509) in 1864 excised a cicatricial stricture of the rectum. The patient made a good recovery, but the stricture recurred, and two years later he was compelled to do a colotomy above the site of the stricture. From this period on to 1890 there were a few isolated cases reported in which the operation was performed.

The statistics and reports are somewhat contradictory owing to the fact that writers and operators did not distinguish between resection and excision and between the different types of strictures. Thus Quénu and Hartmann claim that the first attempt at extirpation of a syphilitic stricture in France was made by Quénu in July, 1890, and was followed by the operations of Richelot, Terrier, and others. On the other hand, Carré gives the credit to Marchant, and states that Dessault had done it as early as 1828. Pinault (Thèse, Paris, 1829) is also known to have excised the lower end of the rectum for stricture in 1826. While these early operations are put down under the heading of cancer, Carré says that it is clearly apparent from the cases cited by Pinault that some of them at least were syphilitic. In the discussion before the Société de Chirurgie of Paris in 1891, Richelot stated that the operation of excision for syphilitic stricture of the rectum was a success; that whatever the method, "the stricture is cured forever without infirmity." Quénu indorsed this statement at the time, but, as will be seen later on in his own statistics, its truth is questionable.

Strictures of the rectum may be removed by the perineal or sacral routes.

Perineal Method.—The perineal method is applicable to those within 6 centimeters ($2\frac{3}{8}$ inches) of the anus. If the sphincters and the anus are involved, the whole anal circumference is dissected out and the rectum amputated at the upper level of the stricture; if the constriction is above these parts, the operation may be performed in several ways. First, the sphincters are incised in the median line back to the tip of the coccyx; a circular incision through the entire thickness of the gut is then made around the rectum just above the internal sphincter; the flaps containing the muscles are then drawn to each side and the rectum is dissected out to the upper level of the stricture; if possible without too much hæmorrhage or too prolonged dissection, the gut may be dissected farther upward, dragged down and reunited to the edges of the mucous membrane covering the sphincter muscles. If the amount of gut removed renders this impossible, the wound may be left open to heal by granulation, a large-sized rubber tube being introduced into the caliber of the gut above for the purpose of conveying outside of the wound as much faecal material as possible. If it has been possible to drag the gut down and suture it to the mucous membrane, then it is wise to suture the sphincter muscles together where they were divided, otherwise this should not be done. Second, an elliptical incision is made embracing $\frac{3}{4}$ of the posterior circumference of the anus, and deep enough to go above the sphincters; this flap is dissected forward, thus amputating the rectum above the muscles; the rectum is then dissected out up to the superior limits of the stricture and cut off; if possible, the gut is then dragged down and reunited to the flap, including the sphincters, and the latter is sutured in position. If this is impossible, an opening is made on the side of the coccyx and an artificial anus formed at this point. After the patient's general condition has improved from the relief given by this operation, the gut may be dissected out either by the sacral method or through the wound alongside of the coccyx, and brought down and sutured to the flap, which, having been allowed to lie loose in the perineal wound, will need to be dissected up and freshened in order to obtain a suitable place for the reattachment of the gut.

These are the methods of choice in strictures which do not extend more than 6 centimeters ($2\frac{3}{8}$ inches) above the anal margin. When higher than this the sacral route is more satisfactory.

The Sacral Method.—The sacral method consists in some modification of the Kraske operation for excision of the rectum. Where the stricture is within the first 10 centimeters ($3\frac{1}{8}$ inches) there is no necessity to remove anything more than the coccyx in order to excise it. Abundant room can be obtained by this procedure.

Where it extends higher than this, it may be necessary to cut off a

triangular piece from the sacrum, thus giving a wider operative field, or to adopt Rydygier's method, in which the bones are all preserved and restored to their normal position, and thus the floor of the pelvis is not impaired.

Having exposed the rectum by this means, it should be clamped with long-bladed forceps in order to control bleeding, and then the dissection should be carried as far up as necessary to remove the entire stricture and bring the portion of the rectum above the stricture down to the healthy tissue below it. By proceeding in this manner, if it is necessary to open the peritonæum, there will be little danger from infection, inasmuch as the gut will not have been opened until after all this dissection is completed. Having loosened the gut as high up as is necessary, the peritoneal cavity should be closed either by sutures or by tamponing with iodoform gauze. The gut should then be cut off through the healthy tissue above the stricture, and the diseased section dissected out from above downward.

The point in this technique is, first, to control the hæmorrhage, which comes largely from the superior hæmorrhoidal vessels; and, secondly, to accomplish all the intraperitoneal dissection and close this cavity before the gut is opened, thus avoiding the greatest danger from sepsis in this operation. Having dissected out the stricture down to the healthy tissue below, it should be cut off and the two ends of the remaining gut united by end-to-end suture, the Murphy button, or by invaginating the upper end through the lower, and suturing it outside of the anus. The bone-flap is then sutured back in its normal position with silkworm gut and the external wound closed, with the exception of its lower angle, which is left open for drainage. The technique of this operation is fully described in the chapter on Extirpation of the Rectum. Where the stricture is in the pelvic colon it should be removed by the abdominal route, with end-to-end union, as is done in cancer of this region.

Results.—After the reports of Richelot, Quénu, and Carré in France, Kelsey and Weir in New York, and Alberan and Kraske in Germany, excision was hailed with great enthusiasm as having solved the treatment of rectal stricture. The stricture being removed, the obstruction obliterated, the patient was cured, notwithstanding the fact that they suffered frequently from small fistulas and perineal phlegmons. The mortality from the operation in the beginning was comparatively small, about 10 per cent. Longer observation of the cases began to show a recurrence of the stricture even in a worse form than previously, and the enthusiasm subsided. Lachowski (Thèse, Paris, 1894-'95), in a careful study of this subject, shows that the recurrences after this method are almost as large in proportion as after complete proctotomy. Quénu and Hart-

mann (*op. cit.*, p. 325) give a detailed account of 35 cases, in which there were 4 deaths directly due to the operation—a mortality of 11.43 per cent. Of the remaining cases, 1 succumbed to pneumonia in about six months, 1 was at the time of the report in a dying condition from tuberculosis, and 10 were lost to view. In the 19 cases which they were able to observe for some months to four years, the results were as follows: One had been compelled to submit to a colotomy, the stricture having returned; 18 others were suffering from rectitis and suppuration sufficient to compel them to wear napkins; 1 had a stercoral fistula; 8 suffered from incontinence of gas and liquid fæces; and 6 had a clear recurrence of the stricture. In 8 only were the faecal movements normal. It must not be presumed, however, that the 8 cases were radically cured, for the authors state that they all suffered more or less from suppuration, a thickening of the mucous membrane, and a rigid, cylindrical and abnormal condition of the rectum.

Lapointe (*La presse médicale*, 1898, p. 153), in reviewing the subject, collected 69 cases with 10 operative deaths and 1 due to septic infection of the sacral wound shortly afterward, thus giving a mortality of 14.5 per cent. Forty-seven were done by the perineal method with 8 deaths, a mortality of 17.2 per cent; 20 by the sacral method with 2 deaths, mortality 10 per cent; and 2 by the vaginal method, in both of which the results were good. In addition to the 10 operative deaths, 4 others died within the first year, thus leaving 55 cases. Of these, 31 were observed for less than one year and 24 for more. In the 24 cases there was a recurrence in 12, or 50 per cent. In 38 cases done by the perineal method, 19 had more or less incontinence. In 15 done by the Kraske method, incontinence was noticed six times; thus in the 55 cases incontinence has followed in 25. Prolapse occurred in 3 cases done by the Kraske method, but no cases of this are reported in the operations done by the perineal route. It is reasonable to suppose that the majority of the cases which were lost to view were successful, inasmuch as they were in favorable conditions when last seen. Therefore, one may state that, barring a certain amount of inconvenience due to ulceration, small fistulas, or incontinence, 50 per cent of these cases have been practically cured. These results, while not satisfactory, certainly are an improvement over the old methods of treating stricture by internal and complete proctotomy.

Proctoplasty.—Where there has been great destruction of tissue around the margin of the anus or the lower portion of the rectum, followed by large, dense cicatrices, it will sometimes be impossible to restore the caliber of the gut without resorting to some form of plastic operation. No rule can be laid down for these conditions. The ingenuity of the surgeon will be put to the test in each individual case.

Krouse, of Cincinnati, has reported an interesting example of what may be done by this method in the case of an extensive stricture of the anus following a burn. He dissected up a large triangular flap from the buttock, swung it around into the space from which he removed the extensive cicatrix, and sutured it in position. The parts healed promptly, and the final result was a comparatively normal anus.



FIG. 174. — TROCAR FOR INSERTION OF FEMALE SEGMENT OF MURPHY BUTTON IN BACON'S OPERATION FOR STRICTURE OF THE RECTUM.

Williams, of Melbourne, enlarged the caliber by a plastic operation entirely within the rectum. He incised an annular stricture from above downward under rigid antiseptic precautions. The incision was then sutured obversely in its long axis so that the wound was made to extend horizontally around the rectum. By this ingenious procedure the caliber of the gut was increased by just the length of the wound, and the immediate result was a relief of the stricture. The case was reported within a few months after healing, and therefore the permanency of cure can not be vouched for.

Swartz (*Presse médicale*, 1894, p. 304) modified this procedure by approaching the rectum from the outside through an incision made between the coccyx and anus. He incised the gut longitudinally, and sutured its walls together after the manner of Williams. The wound in the skin was left open for drainage, and a large-sized drainage-tube was introduced into the rectum to facilitate the escape of gases and liquid fecal matter. This case was also reported within a month after the operation,

and the ultimate result can not be stated; it is mentioned simply because it has been referred to a number of times in literature as having cured the stricture.

Skin-grafting and plastic operations about the margin of the anus are practical methods known to every surgeon, and where there is an intractable granulation associated with large cicatricial deposits, one may greatly improve the patient's condition by employing these.

Lateral Entero-anastomosis.—Bacon (*Mathews's Med. Quarterly*, vol. i, p. 1, 1894) has described a most ingenious method for the relief of stricture of the rectum when situated above the sphincteric region. It consists in bringing a normal loop of the sigmoid down and anastomosing it with the rectum below the stricture, as follows: After the patient has been properly prepared and etherized, he is placed in the extreme

Trendelenburg posture, and an abdominal section is made from the pubis to the umbilicus. The sigmoid is then folded downward until it reaches well below the stricture, and thus the point at which the anastomosis is to be made is measured. It is then drawn well out of the abdomen, and with Murphy clamps above and below this point, a longitudinal incision is made into the gut between them and the male half of a Murphy button secured in this incision. After having scarified the peritoneal surfaces of the sigmoid and the rectum, the female half of the button is introduced into the wall of the latter in the following manner: an instrument carrying a short trocar (Fig. 174), which passes through the hole in the button, is pushed up into the rectum by an assistant and pressed against the anterior wall of the gut just below the site of the stricture, while the operator, with his hand in the abdominal cavity, presses down upon the trocar and causes it to penetrate the wall, carrying the neck of the button along with it. The two



FIG. 175.—LATERAL ENTERO-ANASTOMOSIS (Bacon).
A, mesorectum.

ends of the button are then seized by the operator and approximated, and the anastomosis is complete. Two or three sutures are placed in the peritoneal layer of the gut (Fig. 175) in order to fortify the anastomosis made by the button and also to prevent any loops of the small intestine coming in between those of the sigmoid flexure and the rectum. If the operation has been carefully performed, no faecal extravasation or leak-

age will have occurred in the abdominal cavity, and the latter may then be permanently closed. The button will be expelled in five to seven days, after which an enema may be given by the rectum, and the colon thoroughly washed out. After this a long clamp is inserted through



FIG. 176.—CLAMP INTRODUCED THROUGH STRICTURE AND ANASTOMOTIC OPENING IN ORDER TO WIDEN THE CALIBER OF THE GUT IN BACON'S OPERATION.

the anus, one blade of which is introduced through the button-hole into the sigmoid while the other extends through the stricture and upward into the rectum (Fig. 176). The clamp is then firmly closed, thus embracing the stricture in its bite. On each succeeding day the handles of the clamp are closed little

by little until the sæptum is completely severed, which usually occurs upon the third day. By this means the caliber of the gut will be increased to that of the sigmoid flexure plus the former caliber of the stricture. Bacon states that where the stricture is low down the operation may be done by the sacral method. The operation has no advantages over resection and end-to-end union in strictures of the sigmoid flexure. He employed this ingenious method upon 4 dogs, 2 by the abdominal and 2 by the sacral method, and all were successful; later on he applied it with success in an old, specific, rectal stricture in a woman.

Colotomy.—In non-malignant strictures colotomy is generally looked upon as a last resort, one which patients and surgeons avoid until obstruction is imminent, and until recently the operation has only been done when this has occurred or the pain has become unbearable.

As early as 1824 Martland performed a left iliac colotomy to overcome obstruction due to a stricture, and thus prolonged his patient's life for more than seventeen years (*Edinburgh Med. and Surg. Jour.*, vol. xxiv, p. 271).

In 1865 Curling did a lumbar colotomy for the first time with the deliberate intent of preventing obstruction in an incurable stricture (*Amer. Jour. of Med. Sci.*, 1873).

Allingham performed the operation in 1867, and Glaeser (*Archiv f. klin. Chir.*, Berlin, 1867-'68, p. 509) operated upon a woman for intestinal obstruction due to a stricture which he had already excised and which had recurred. Twenty years later (*ibid.*, 1887, vol. xxxiv, p. 459)

he had the unusual opportunity of making an autopsy upon the body of the patient, establishing clearly the specific nature of the original stricture, and showing that the pelvic colon and rectum had been reduced to nothing more than a long, narrow, fibrous cord perforated by a small canal which would admit only the finest sounds, and was surrounded by inflammatory tissue. He says the "cavity of the cord is lined with a membrane which seems more like a serous than a mucous membrane." The interesting point of this case is, that notwithstanding the strictured portion of the gut below the artificial anus had been absolutely devoid of functional activity for nearly twenty years, it still remained patulous.

From this period forward operators in America, England, Germany, and France (Hochenegg, *Arb. U. Hahresh. d. K. K. ersten chirur. Universitäts Klinik zu Wien*, 1888-'89, p. 122; König, *Berlin. klin. Woch.*, 1887, p. 17; Hahn, *Archiv f. klin. Chir.*, Berlin, 1883, Bd. xxix, p. 395; and Mason, *Amer. Jour. of Med. Sci.*, Philadelphia, 1873, vol. ii, p. 354) have more and more resorted to colotomy in cases of stricture of the rectum. Excellent results have been obtained, and long periods of life have followed the operation in cases of non-malignant stricture. In a case of the writer's, the patient survived eleven years after an artificial anus was made for an intestinal obstruction due to syphilitic stricture.

Where the stricture is inoperable by excision or proctotomy, when it has recurred after these operations or where obstruction takes place, there is no question as to the advisability of this operation. Recently some operators, recognizing the fact that by functional rest and local and constitutional treatment, much may be done to promote the absorption and disappearance of a stricture of the rectum, have undertaken the cure by making temporary artificial ani, side-tracking the faecal current, thus giving the opportunity of treating the strictured canal from both ends. By this means complete drainage is obtained, the distention and irritation are stopped, obstruction of the faecal current at the point of stricture is avoided, and the dangers of infection from the intestinal contents are practically eliminated in case it is necessary to excise the gut or dilate the stricture.

Lowson and Kammerer were among the first to employ this method as a preliminary procedure for the extirpation of non-malignant stricture, and Thiem (*Verhandlungen d. deutsch. Gesellsch. f. Chir.*, Berlin, 1892, p. 46) first employed it as a preliminary to the treatment of stricture in the sigmoid by gradual dilatation with bougies. After the stricture was completely dilated and apparently cured, he closed the artificial anus, and up to the time of his report the patient had remained perfectly well, the intestines having resumed all their functions.

In 1897 the author made an artificial anus in an Indian woman aged

twenty-two, in the workhouse hospital of this city, with the view of treating an extensive syphilitic ulceration and stricture of the rectum that occurred within the first year after her infection. The stricture was situated at $3\frac{1}{2}$ inches from the margin of the anus, and barely admitted the tip of the index finger. The mucous membrane of the lower anterior surface of the rectum was entirely destroyed, and it was impossible to determine the extent to which the ulceration extended above the stricture. With a view to treating the stricture and possibly excising it, a *temporary* artificial anus was made in the highest point of the sigmoid flexure. Under the use of antispecific medication, antiseptic irrigation, and persistent dilatation, the ulceration healed, the caliber of the gut was gradually increased, and finally resumed almost a normal appearance. The artificial anus was closed by the extra-peritoneal method, and at the time that the patient left the hospital six months later, her bowels moved regularly, there was no discharge, and so far as could be observed she was perfectly well.

The same method was practised in the Polyclinic Hospital in 1894. In this patient, however, the stricture was of a dense, hard, cicatricial nature, and it finally became necessary to incise it before any material increase in the caliber of the gut could be obtained or healing of the ulcer induced. After complete posterior proctotomy, the caliber of the gut was restored and the ulceration healed, but the dense, hard, cicatricial tissue remained, and could be easily felt by the finger. My impression was that this would be likely to recontract, and much more rapidly if the faecal current were turned again into its natural channel. This was explained to the patient, and as he had learned to manage the artificial anus comfortably, he declined to have it closed. He disappeared from view after this, going upon the road as a traveling salesman, and the last heard of him (some two years later) was that he was perfectly well and enjoying life.

In 1898 the author performed the operation for the treatment of stricture for the third time in the Almshouse Hospital of this city. This patient had been operated upon for supposed cancer of the rectum some two years previous. She suffered a great deal of pain, and there was a large ulceration in her rectum which did not appear malignant.

A temporary artificial anus was made, and the treatment by irrigation and dilatation of the stricture was begun. After three months the caliber of the gut seemed practically restored, and upon the patient's urgent request the artificial anus was closed in May, 1899. In January, 1900, the patient returned to the hospital suffering from constipation, difficulty in obtaining a movement of the bowels, pain in the sacrum, and more or less purulent discharge. An examination of the rectum revealed the fact that the stricture had recurred, this time more

dense and fibrous than before. For the third time in her case colotomy was done and a permanent artificial anus made, after the method of Bailey. For some reason or other the patient had a severe hæmorrhage from one of the mesenteric vessels two hours after the operation, and she came near losing her life from it. She still remains in the hospital at the present day; she is obdurate with regard to the use of bougies; and consequently the stricture has not received the attention which it should. Notwithstanding this, the fibrous stricture has greatly softened, showing the effect of local treatment and functional rest upon these conditions. With this limited experience the author is not prepared to make any very positive assertions with regard to the effect of colotomy as a curative agent in stricture of the rectum, but from these cases and the experiences of Thiem and Lowson it is thought that we may hold out to patients afflicted with strictures and excessive ulceration of the rectum a reliable hope of relief from suffering, and the possibility of a cure, with eventual restoration of the fæcal current to its normal course.

Résumé.—In a somewhat detailed manner the different methods for the treatment of stricture have been reviewed, and no very positive preference has been expressed for one over another. The fact is that up to the present time a satisfactory treatment for this condition has not been devised. The dangers of sepsis and hæmorrhage in internal proctotomy would certainly contraindicate its use in the large majority of cases. Complete proctotomy, while less dangerous so far as sepsis and hæmorrhage are concerned, has the disadvantages that it results in protracted ulceration, prolonged incontinence, and recurrence practically always takes place unless the use of bougies is continued throughout life. Notwithstanding these disadvantages, the operation is the least dangerous method for the radical cure of the disease, and often affords the patient much relief for a considerable time. Many cases are reported in which it has resulted in a radical cure, but such results can not be looked forward to with any degree of confidence in the large majority of cases.

The favorable results of the first few excisions done for non-malignant stricture led many to believe that the radical cure of this disease had at last been found. The author has been able to gather from private communications and the journals 25 cases in addition to those collected by Lapointe and Quénu and Hartmann, thus making a total of 94 cases of resection with 14 deaths, a mortality of 16 per cent. When the fact is recognized that all strictures, whether malignant or non-malignant, prove fatal in the course of time unless properly treated or removed, this mortality should not offer any great argument against the performance of an operation which promises a radical cure. Un-

fortunately the results thus far obtained by resection do not justify the statement that a radical cure will be obtained in the majority of cases.

Investigation shows that in one-half of the resections for non-malignant stricture of the rectum there has been a recurrence *in situ*, whether the stricture has been of a specific or of a simple inflammatory nature. Assuming, however, that of the cases which have survived the operation a radical cure may be obtained in one-half of them, it would still be necessary to conclude that this method is superior to any which is known for the treatment of stricture. Nevertheless, in cases with extensive ulceration and suppuration, this operation is very dangerous to life, and the formation of a temporary artificial anus, followed by local treatment and dilatation, is a far safer procedure, and will accomplish just as good results in a large number of cases of this type as attempts at resection or proctotomy.

After the ulceration and suppuration have been controlled, and it is found that the stricture persists, or has a tendency to retract, resection may be done without so much danger of infection, and with a greater probability of immediate union between the sutured ends. In brief, a temporary artificial anus, with gradual dilatation and local treatment, and, if necessary and practicable, the eventual resection of the stricture, seem to furnish the most rational as well as the safest method of treatment.

CHAPTER XIV

CONSTIPATION, OBSTIPATION, AND FÆCAL IMPACTION

CONSTIPATION consists in the passage of insufficient amounts, or the abnormally prolonged retention, of fæcal material in the intestinal canal. A healthy individual passes upon an average 6 ounces of fæces in twenty-four hours. These figures, however, are only relative; the amount of fæcal material depends not only upon the food ingested, but the quality of the food and the activity of the digestive functions. Active, energetic individuals living an outdoor life consume large quantities of food of a mixed variety, and therefore their fæcal dejections are much greater than those of individuals who lead a sedentary life and consume small quantities of a limited dietary. Farmers and other individuals who live chiefly upon vegetables, cereals, and the coarser articles of food, pass larger quantities of fæces than the more pampered classes who consume small quantities of concentrated and refined foods, in which there is a minimum amount of indigestible detritus. Constipation exists in both of these classes, but it can not be based upon the amount of fæces passed. So also is the period of the retention of fæcal material in the intestine comparative. It requires from fifteen to twenty hours for the food to pass through the intestinal canal. The ordinary assumption based upon these figures is that every normal individual should have a stool of adequate quantity once in twenty-four hours. So imbued with this idea are the laity in general, that one who does not succeed in having such a passage, or whose passages do not appear to be normal in quantity, quality, color, or consistence, immediately considers himself the victim of constipation, and begins to take drugs or enemata to remedy the condition.

Fæcal movements, while more or less involuntary, are matters of habit and education to a large extent. One can accustom his bowels to move twice a day, once a day, or once in three, four, or five days, and ordinarily an individual whose fæcal periods are regular every three days is just as healthy as another whose bowels move twice a day. A child may be educated in infancy to have fæcal passages twice a day, and this will be maintained as long as there are no pathological condi-

tions and no mental diversions or preoccupations to interfere with attention to the periodic calls. This periodicity can be established in any healthy intestine, and often establishes itself unconsciously in accordance with the occupations and habits of the individual, as is shown in the following case:

J. A., a railroad conductor, had a night and a day run from Philadelphia to Chicago, leaving one morning and arriving the next; on his return trip he left at night and arrived the following night; thus he was at home every third night and every third day. Without any conscious effort on his part, his bowels established the habit of moving in the evenings of the nights he remained at home, and in the mornings of the days which he remained there, and never, except under unusual circumstances, had any inclination to move at other times.

Many instances of such irregularity and prolonged retention of *faeces* could be cited, but it is enough to state that the length of time between *faecal* passages is so variable in individuals that what constitutes constipation in one is not in the least conclusive of such a condition in another.

Those extreme instances in which long periods of time elapse between the stools are frequently due to some idiosyncrasy or deformity, and they can only be considered as curiosities in this connection. Mathews (*Diseases of the Rectum*, p. 58) reported a case in which the *faecal* movements occurred at first once in two weeks, and gradually extended the time until finally the patient's bowels moved only once in four months. In this case a movement of the girl's bowels was not only an event in the family but to the entire neighborhood. He states that there was no impaction, disease, or unnaturally contracted condition in the intestine, that no odor emanated from the body, and that little damage resulted to the general health. The extreme and alarming reflex symptoms produced in this case by the introduction of the bougie and flooding the colon with water, and the collapsed and exhausted condition after *faecal* passages, clearly indicated some irritable or obstructive point in this canal which would account in a large measure for the girl's constipation in the first place.

The author had a patient who claimed that he only had a movement once in twenty-eight days, and always at the full of the moon. These instances, however, are almost insignificant when compared with the cases reported by Strong (*Am. J. of Med. Scs.*, October, 1874, p. 440), in which the movements occurred once in eight months and sixteen days; Inman (*Half-Yearly Abstract in Med. Scs.*, vol. xxi, p. 275), once in two years; Valentine (*Bull. de scs. méd.*, t. x, p. 74), once in nine months; Devillier (*J. de méd.*, 1756, t. iv, p. 257), once in two years; Chalmer (*Med. Gaz.*, London, 1843, vol. xxi, p. 20), once in three years, and a case (*Records of the Phila. Med. Museum*, 1805, vol. i, p. 305)

where the patient had only one movement in fourteen years. Medical literature is full of such eccentricities, and, strange to say, these individuals in the majority of cases have maintained comparatively good health.

The only explanation of such facts is that they have lived upon a diet in which there were small quantities of indigestible substances, and that their digestive and assimilative functions have been sufficiently active to appropriate all the ingested material, with the exception of a very minute proportion.

Leaving out of account these phenomenal cases, and coming down to the every-day individual with whom the physician has to deal, in order to determine whether a patient is really constipated or not, one must acquaint himself not only with the dietary of the individual but with his habits from childhood in regard to fæcal movements, and his occupation and practices at the time of consultation.

Constipation is not a disease in itself, but a symptom or manifestation of functional or pathological conditions. It is produced by whatever conditions retain fæcal detritus in or retard its passage through the intestinal canal. In those cases in which the fæcal discharges are less than normal on account of insufficient or improper food, the patient usually suffers no inconvenience from the apparent constipation; under such circumstances, if he can be convinced that the fæcal passages are entirely adequate in proportion to the amount of food taken, and persuaded not to indulge in laxative or cathartic medicines, the greatest good will be accomplished for him. In such cases as suffer from œsophageal stricture, ulceration of the stomach, cirrhosis of the liver, strictures, cancers or tumors of the pylorus, stomach, or upper end of the small intestine, all of which prevent the ingestion of normal quantities of food and limit that which is taken to the most concentrated forms, the fæcal passages will not only be very small in quantity but ordinarily at widely separated periods. Such cases as these can not be called constipated, for the intestinal functions are perfectly normal, in that they act whenever there is sufficient material for them to act upon.

Defecation.—In order to understand constipation, one must be familiar with the processes by which the ingested material passes through the alimentary canal, and the conditions necessary to establish normal passages. Practically one may say that up to the last moment at which the fæcal mass is extruded from the body, the ingested materials are carried through the intestinal tract by what is known as peristaltic action. The food is received into the stomach and the albumenoids are subjected to the action of the gastric secretions, thus being converted into peptones; after this it is passed through the pylorus into the other sections of the intestine.

The reaction of the contents of the stomach as they pass little by

little through the pylorus is acid; the secretions of the small intestine, the bile, and the pancreatic fluid are all alkaline; thus, when the acid contents of the stomach are poured into the small intestine, they produce a stimulation or irritation which causes a wave of muscular contraction constituting peristaltic action. At the same time the chemical reaction of this acid substance upon the alkaline contents of the intestine creates certain gases which serve to distend the caliber of the gut, stimulate still further the muscular contractions, and thus facilitate the passage of the semifluid substances through the tract.

These gases consist largely of carbonic-acid gas, nitrogen, carbureted hydrogen, hydrogen, and sulphureted hydrogen (Planer, *Sitzungsberichte d. Akadem. d. Wissenschaften zu Wien*, vol. xlii; S. J. Charles, *British Med. Jour.*, February, 1885). The presence of these gases, therefore, is not abnormal or detrimental, but, on the contrary, most useful. It is only when they are found in improper proportions and are more irritating than normal that they are unhealthy, in that they produce too rapid and severe peristalsis and too great distention of the intestinal canal, thus causing atony or paralysis of the circular fibers and consequent inability to contract.

Ordinarily the gases are reabsorbed by the blood-vessels or discharged with the fecal mass through the anus. If, however, there is any interference with such absorption or passages, either through catarrhal inflammation and consequent mucous coating of the intestinal canal or through obstruction due to volvulus, acute angulation or stricture, the gases will accumulate and cause overdistention, or pass backward alongside of the fecal materials in the intestinal canal and into the stomach, being discharged in this direction. Other sources of stimulation, aside from acid peptones and the production of gases, are the harsh, undigested particles of food which were not acted upon by the gastric secretions. These also stimulate the muscular contractions of the small intestine.

In addition to these intra-intestinal stimulants to peristaltic action, there is another which is of great importance, and is generally disregarded in the discussion of this subject; it is the to-and-fro movement imparted to the intestine by the processes of respiration. The up-and-down movement of the diaphragm during every inspiration and expiration imparts to the small intestine in particular, and to the transverse colon, a movement which accomplishes a churning, as it were, of the intestinal contents, changes the position of the guts, and thus contributes to the movement of the substances along the alimentary canal. The importance of this stimulus can not be overestimated, for its impairment, either by lack of exercise, improper clothing—such as tight corsets—or disease, soon exhibits itself in inactivity of the intestinal

functions, and the development of constipation or other intestinal derangements.

Overstimulation of the intestinal mucous membrane by too large quantities of acrid food, or by too much coarse, indigestible fiber, is likely to result in decreased sensitiveness of the nerve-ends, and consequent inactivity of the muscular contractions. While a certain amount of these substances is desirable in one's dietary, an excess of them may result in the very condition which they are intended to obviate.

The peristaltic action of the small intestine is accomplished largely by the circular muscular fibers. There are some very fine longitudinal fibers in this portion of the intestine, but their action is doubtful. As the fæcal material here is almost always fluid or semifluid there is little necessity for longitudinal fibers to draw the intestine up over the mass which is squeezed down by contraction of the circular fibers.

The processes of digestion are practically completed in the small intestine, and the absorption of chyle takes place at the same time through the villi. By the time the food reaches the cæcum, therefore, a large proportion of its nutritive elements are absorbed. Its fluid character, however, is not very greatly diminished, and on this account it is easily pushed through the cæcal or Bauhinian valve into the ascending colon. As this portion of the large intestine runs directly upward, the fæcal material must therefore travel directly against the force of gravity, consequently its hitherto rapid movement is checked, and it rests in this position for a considerable time. As a consequence of this, absorption of the fluids takes place largely at this point, and by the time the fæcal matter reaches the upper portion of the ascending colon it becomes quite consistent. On this account it requires the mechanism of the fully developed longitudinal muscular fibers to pull the intestinal wall upward (with regard to the course of the intestine) over the mass after it has been squeezed forward by the circular fibers. In consequence of this hardening or solidification of the fæcal material composed largely of the fibrous and indigestible portions of the food, the mucous membrane of the colon is constantly more or less irritated by it, and becomes thickened and less sensitive than that of the small intestine.

These facts are of considerable importance when one considers the subject of artificial anus on the right side. The further the opening in the colon is made from the cæcal valve the more solid will be the fæces, and therefore less inconvenience will result from their constant escape through it.

Where there is too much fibrous or indigestible material taken for considerable periods of time, and it accumulates in the colon, the mucous membrane may become so insensitive that the gases and rough materials

fail to stimulate peristalsis; consequently the patient will develop a tardy movement of the faecal mass and undue distention of the intestine, which resolves itself into atony of the muscles, chronic constipation, and sometimes impaction.

The glands in the large intestine are not only absorptive but secreting glands, being possessed of a large number of goblet or mucus-producing cells. When the intestine has been overstimulated and irritated by the prolonged presence of hard faecal material, an excess of mucus is secreted, and we have developed what is known as *mucous colitis* or hypertrophic catarrh.

After the faecal mass has been carried through the ascending colon around the hepatic flexure into the transverse colon, if this latter portion is in its normal position it travels through a horizontal tract in which the movement is more rapid and less difficult. Here it is subjected to the action of the abdominal muscles and the diaphragm. If, however, the transverse colon be displaced, as it frequently is in enteroptosis, sagging downward in the abdominal cavity below the umbilicus and even to the pubis, the faecal mass will be arrested or retarded in this portion of the tract.

When the mass has once been emptied into the descending colon, it passes downward to the sigmoid flexure by the force of gravity and peristaltic action of the gut. Unless there is some coarctation of or pressure upon the intestine, it passes through this section rapidly enough.

The sigmoid flexure when empty lies chiefly in the pelvic cavity, its loops running horizontally downward, upward, and downward again to join the rectum. Next to the caecum this is the most distensible portion of the large intestine, and is the typical reservoir for the storage of faecal material. When empty or partially filled, this portion of the large intestine forms an acute angle with the rectum, which practically closes the communication between these two organs. Besides this, at the junction of the two there is an aggregation of circular fibers upon one side which act as a sort of valve to prevent the escape of the faecal mass into the rectum so long as the acute flexure exists. When, however, the sigmoid becomes distended with faecal matter or gases, it rises upward into the abdominal cavity, straightens out the flexure at the junction between it and the rectum, thus opening up the passage between the two organs and facilitating the escape of the faecal material downward. If from any cause, such as inflammatory adhesion, adhesive bands, tumors, or other conditions, the sigmoid is prevented from rising up into the abdominal cavity, the faecal mass will then have to be lifted directly upward and forced past the contracted orifice connecting it with the rectum in order that a movement of the bowels may take

place (Fig. 177). Such conditions are among the most frequent causes of constipation.

After the fæcal mass has been passed into the rectum from the sigmoid, it is carried downward by the force of the rectal muscles. It does not drop into a vacant cavity, as is sometimes described, but is directed by the folds of Houston in a rotary course from one side of the intestine to the other until it reaches the anal canal, which is normally closed by the sphincter muscles. When the fæcal mass reaches this lower portion of the rectum, around which are distributed the sensitive nerves, the inclination to go to stool becomes imperative. If the place and season are appropriate, and there is no local condition at the anus preventing the same, a fæcal passage occurs, but it can generally be restrained by voluntary contraction of the sphincter.

Reverse Peristalsis.—It was stated by O'Beirne that when the fæcal mass has been passed into the rectum and is not immediately expelled, a reverse peristalsis takes place which carries it upward into the sigmoid again; also that the rectum, except in its lower dilated portion, is always empty of fæces. These statements have been accepted by the large majority of writers upon this subject; but, after carefully studying it, and examining many cases with regard to these facts, it is not possible to verify them. In 9 out of 10 cases examined at any period from two to three hours after a movement, one will find a greater or less quantity of fæcal material in the lower portion of the rectum. If pledgets of cotton, plain, coated with vaseline or soaked with water, are introduced into the rectum and left there for two, three, six, or twenty-four hours, during which time the patient has no movement of the bowels, at the end of the time the pledgets will be found in the ampulla of the rectum just where they were left. When the rectum has been thoroughly filled with fæcal material and there is an obstruction at the anal outlet, it is possible that muscular straining and contraction of the rectal walls may force the mass upward instead of down-



FIG. 177.—DIAGRAMMATIC ILLUSTRATION OF ACUTE FLEXURE BETWEEN THE SIGMOID AND RECTUM.

ward, because this is in the line of least resistance; there may also be an apparent peristaltic action upon fluid materials and gases in cases where there is a tight sphincter and voluntary resistance to the passage downward. In such cases there is no absolute closure of the intestine above, but simply a circular contraction of the canal which decreases the caliber and capacity of the gut as it proceeds downward toward the rectum in a wave-like manner; when the wave reaches this organ and decreases its capacity, the contents are forced to move in some direction, and they escape upward into that portion of the intestine which has become relaxed by the passage of the peristaltic wave beyond it; thus, wave after wave acting in a similar manner, the contents are carried upward through a certain portion of the alimentary tract.

The author has examined the peristaltic action in a large number of cases in which the abdomen was opened, and he has never yet seen any reverse wave; fluid injected into the rectum while the sigmoid flexure was exposed has not been carried up by any such motion. Moreover, if there were such a reverse peristaltic action, it appears that it would manifest itself in those cases in which an artificial anus is made for tight strictures of the rectum, and in which accumulated fecal masses are left below the artificial opening. Within the past year this latter condition was observed no less than four times, and in each case it was necessary to remove the fecal masses from the distal portion of the sigmoid by mechanical means. There has never been the least tendency toward retroperistaltic action to relieve this accumulation; it seems, therefore, when the fecal mass has once passed into the rectum, it remains there until it is removed by natural or artificial means, and the longer it remains there the drier and harder will it become on account of the gradual absorption of its fluid constituents by the glands of the organ.

The process of defecation may therefore be briefly described as consisting first in peristaltic action of the entire intestinal tract, which eventually brings the fecal material down and stores it in the sigmoid flexure; as this organ gradually distends it rises upward out of the pelvic cavity, unfolding its convolutions and the flexure between it and the rectum, thus opening up to a greater or less degree this narrowed aperture. When the sigmoid has been straightened out sufficiently to bring its last loop in a more or less straight line with the upper segment of the rectum, the gas and fecal material pass into the latter and are carried downward as before described until they reach the lower end or sensitive area of this organ; at this point the stimulation of the cerebro-spinal nerves causes a closer contraction of the external sphincter muscle, and the mass is arrested until the mental action of the individual brings into play the inhibitory power over this muscle,

causing it to relax and thus admit of a fæcal movement. Under certain circumstances, however, the peristaltic force is so great that it overcomes the resistance of the external sphincter and involuntary movements occur.

At the moment of stool, if the mass is at all hard, the assistance of the abdominal muscles and the diaphragm are brought into play through the process called "straining." This straining compresses the small intestines, the sigmoid flexure, the bladder, and through these organs the rectum; owing to the protected position of the ascending and descending colon, it has little influence upon these portions of the intestinal tract.

Remission of Inclination to Defecate.—When the inclination to have a passage is resisted, the desire often passes over, and may not occur again until the next regular period for such a movement. This remission of desire lends a plausibility to the theory of O'Beirne, but the mass is never lifted back into the sigmoid. It simply adjusts itself to the rectal ampulla, and the parts become tolerant of its presence. If the rectum is inflamed or the fæces fluid, this tolerance will not be manifested.

From this description of the functional action of defecation, one may infer that whatever interferes with the passage of the fæcal mass through the intestinal canal will develop constipation. On the other hand, whatever exaggerates these functional actions, hastens the ingesta through the intestinal tract, increases the amount of the fluid secretion therein, or unduly stimulates the peristaltic action, will bring on "diarrhœa."

At the heading of this chapter the terms *constipation*, *obstipation*, and *impaction* have been used; the distinction between these different terms must be borne clearly in mind.

By constipation is understood a condition of insufficient and tardy fæcal passages due to functional conditions or diseases of the intestinal tract.

Obstipation refers to those conditions in which there is a sufficient quantity of fæcal material and adequate functional activity, but in which there exists some deformity, growth, or contracture in the intestinal tract that causes mechanical obstruction to the passages.

By impaction is understood an accumulation of fæcal material, usually hard, dry, and stuck together in a mass, which is arrested at some point through an organic or spasmodic narrowing of the intestinal canal.

The symptoms of constipation and obstipation so overreach one another that it is almost impossible to clearly separate them without much repetition, therefore we will describe them together.

Etiology.—The causes of these conditions may be defined as functional and mechanical, predisposing and exciting; those cases due to functional derangement are true constipation, while those due to mechanical obstruction are obstipation.

Predisposing Causes.—Heredity.—The influence of heredity in constipation is very marked; the condition may occur in all the members of a family, and frequently it occurs in three and sometimes in four generations.

Predisposition to catarrhal conditions, the habits of life, carelessness in attention to the activity of the bowels, the continuous use of laxatives and their administration to children, account in a large measure for this apparent heredity. Nevertheless there are a certain number of cases in which the father and mother are constipated, and their children inherit this tendency, notwithstanding the most careful hygienic regulations and abstinence from the administration of laxatives. In such cases, the children are born with deficient intestinal secretions and peristaltic action. There is generally in these cases frequent urination, which accounts in a measure for the dryness of the fecal mass and the difficulty in its movement along the intestinal tract.

Age.—Age has considerable influence in the production of constipation. Old people, owing to deficient exercise, relaxed muscular conditions, and decreased peristaltic action, together with insufficient intestinal secretions which render the fecal mass dry, are ordinarily the victims of this disorder. The functions of the animal economy at this period of life are less active, the appetite less voracious, and consequently the fecal passages adequate to maintain good health are not necessarily so abundant or so frequent as in earlier life.

Old people are seen frequently whose bowels move once in three or four days without any artificial stimulation, and who are in perfect health, with the exception that they suffer from a mild degree of hemorrhoids. Such can not properly be called constipated.

Very young children are more subject to constipation than those aged two years and upward. This is due occasionally to malformations, such as narrowing of the intestinal tract at some point. It is often caused by artificial feeding, or by a deficient quantity of lactose in the mother's milk. The concentrated, uniform diet of milk unless freely supplied with this laxative tends toward costiveness, whether in the adult or in the child. Lack of exercise and deficient oxygenation will also account in a measure for the condition in young children. The fact remains, however, and is inexplicable, except upon the ground of heredity, that a large number of children born under similar circumstances, fed in a similar manner, with equal hygienic care and identical environments, differ materially in the functional action of their bowels.

Some exhibit symptoms of constipation from their very birth without any anatomic conformation to account for the same, while others pass through infancy with perfectly normal physiological actions. In children from three to twelve years of age constipation is rather a rare disease; the period of puberty or adolescence, from twelve to twenty years of age, however, is frequently the time when this habit is developed. Especially is this true in the higher walks of life, where false modesty or prudery with regard to the natural functions causes young women and young men to neglect the calls of Nature, or rather to refuse to honor them lest they excite some thoughts not altogether refined in the minds of persons present. This mock modesty and the absorption in school, society, and domestic affairs bring on the worst types of constipation.

The normal stimulation of the intestinal mucous membrane and the inclination to go to stool may be resisted so persistently that the nerve-ends become insensitive to impressions, and the fæcal masses may lie day after day and week after week in the rectum, sigmoid flexure, and other portions of the colon without any unusual desire for defecation.

A young woman, who went upon a sailing cruise for eight weeks, had only three movements of her bowels during the entire time simply because she was afraid that some gentleman would see her going toward the toilet. The result was a severe proctitis and a constipated condition which required a long time and much treatment to relieve. In such cases it is habit and not age that produces the constipation. In people of middle age it is ordinarily the result of neglect, improper diet, or organic disease.

Sex.—False modesty in young women, the lack of outdoor exercise, neglect of regularity, and after puberty the physiological phenomena in a woman's life, tend toward producing constipation. Congestion of the ovaries, and more or less enlargement of the uterus at every menstrual period, the processes of pregnancy, resulting in prolonged pressure upon the rectum and pelvic colon by the gravid uterus, a general relaxation of the abdominal muscles, and the lack of support to the intestines after childbirth, together with frequent displacement or disease of these generative organs, render the female sex much more subject to constipation than the male.

Occupation.—Occupation is another predisposing cause. A sedentary life, such as that of professional men, bookkeepers, office clerks, seamstresses, etc., predisposes to the development of this condition. Such individuals, unless they are systematic in the habit of going to stool at regular hours and allowing nothing to interfere with this function, are very likely to develop the chronic form. As Johnston says: "Intellectual work, not only from the muscular inactivity which it

entails, but from the diversion of energy to the nerve-centers, develops the constipated habit as well as indigestion."

Painters, workers in lead and other metals are predisposed to it. Sailors, railroad men, and others whose occupations prevent regular attention to these functions are subject to constipation; the large majority of them are habitual users of cathartics, the omission of which results in acute attacks and sometimes in serious results. Here again it is not the occupation so much as the habits which it entails.

The Exciting Causes.—Food.—The normal action of the bowels depends upon the character and quantity of the food taken.

Quality.—Highly concentrated foods produce little faecal material. A vegetable or mixed diet gives rise to a larger quantity of faecal discharge than does an animal diet, at the same time the stools are ordinarily less firm; this is owing to the fact that vegetables contain a larger proportion of water and fibrous material. Within normal limitations, therefore, a vegetable diet is less likely to be the cause of constipation than is a nitrogenous one. On the one hand, vegetables taken in excess produce excessive stools, and the accumulation of fibrous material in the large intestine is likely to bring on an insensitive condition of the mucous membrane, and hence a tardy action which results eventually in chronic constipation; on the other, a purely nitrogenous diet furnishes a very small quantity of refuse material, and consequently small faecal discharges which result in irregular or infrequent stools.

Quantity.—The amount of food taken is also an element in the production of constipation. Cases suffering, as has already been said, from intestinal, oesophageal, and stomachic conditions which limit the quantity of food taken and necessitate its being of the most concentrated varieties, will pass very small amounts of faecal material; such cases, however, can not be considered as constipated. On the other hand, patients may take too much food. People of sedentary habits, who live in luxury and are fond of gastric indulgences, frequently develop the habit of eating large quantities, more than their organs can digest or assimilate, and the result is that they either have enormous passages or there is an accumulation of such materials in the colon with over-distention, atony, and chronic constipation. In such individuals the limitation of the amount of food is frequently the most successful treatment. The small amount of fluids taken is also frequently a cause. It has been determined by physiologists that the average composition of the faecal mass is, approximately, water 75 per cent, solid material 25 per cent. Whenever the liquid constituents fall below 50 per cent the faecal movements are retarded and difficult, and when they reach as low as 20 per cent (Illoway, Constipation, p. 39) the movement is practically impossible.

The dryness of the fæcal material is brought about also by numerous functional or pathological processes. Diabetes, nursing, excessive diuresis, or perspiration reduces the fluidity of the intestinal contents, and hence contributes to the production of constipation. This is also noticed in cases of malarial fever, the night-sweats of phthisis, and as a result of very hot weather in a great many cases.

Good and Everly (Braithwaite's Retrospect, vol. xvii, p. 152) ascribe constipation to an excessive absorption of the fluids in the small intestine. Johnston also states (Pepper's System of Medicine, vol. ii, p. 643) that constipation may be caused by exercises which produce excessive perspiration, and by stimulating the functions in general cause the too rapid absorption of fluids in the intestinal canal.

The necessity, therefore, of consuming a sufficient quantity of water to keep the fæcal passages soft can well be understood. As to whether this water should be taken before meals, with the food, or afterward, is a question to be decided by the condition of the patient's stomachic digestion. Where there is a catarrh of the stomach and an accumulation of mucus in this organ large drafts of water before meals, in order to wash out this material and cleanse the walls of the organ, are desirable. When there is feebleness or inadequacy of the digestive agents in the stomach the patient should avoid taking fluids along with his food, but under other circumstances, such as are found in cases with excessive gastric secretions, a certain amount of water taken at this time will have a beneficial effect. In the class of cases in which water is contraindicated during meals, it should be freely indulged in two or three hours afterward.

Chemical Causes.—The chemical reaction of the intestinal contents is normally acid in a carbohydrate diet, alkaline in a nitrogenous diet, and neutral in a mixed diet. Thus it is that patients who are in the habit of living upon a mixed diet, if they suddenly change to a fresh vegetable and fruit diet, develop a diarrhoea owing to the excessive and unusual acidity of the contents of the large intestine. On the other hand vegetarians, if they change their mode of life and begin to live upon meat and nitrogenous materials, are likely to become constipated. Speaking in a general way, therefore, the proper and normal regulation of intestinal action demands a mixed diet, together with a sufficient quantity of water to maintain the soft or semifluid condition of the stools.

Drugs and Medicines.—In the same line with foods may be classed certain vegetable and mineral substances, which being taken into the intestinal tract bring about delayed or insufficient stools. An excessive quantity of lime salts, lead, opium, tannic acid, alum, etc., all produce this, either by their action upon the mucous membrane or upon the nervous system.

The modern preparations of flour, baking-powder, and various cereals contain greater or less quantities of alum. This powerful astringent, when introduced into the digestive tract results in a limitation of the normal secretions, an unnatural dryness of the fecal mass, and subsequent constipation.

We also include metals, bismuth, etc., either by absorption through the stomach and their effect upon the spinal cord, or by the unconscious action of certain amounts of the metals, very frequently suffer from constipation. It is unnecessary to enlarge upon the effects of opium and its production. Every practitioner is aware of its influence on the rectum, and those who have had to deal with chronic opium *addicts* know how difficult it is, even after the habit has been discontinued, to bring about normal defecation. In such cases where the habit has existed for considerable periods of time, the secreting glands of the intestine become atrophied, the intestines become greatly distended, the walls thinned, the muscles atonic or degenerated, and this condition is quite able to restore them to their normal condition.

It has been also said by Johnston to be the cause of constipation, but the fact has been observed that where patients have relinquished the tobacco habit, they frequently suffered more from constipation than from any other complication; in a number of such cases the doctor failed to have the patient return to his morning cigar or pipe to relieve the nervous condition to which drugs, enemata, and dietary treatment afforded little relief. There are some individuals in whom too much tobacco, or some others invariably induce a diarrhoeal movement of the bowels, but the claim that smoking has a constipating effect is not tenable. There may be cases, however, in which the habit of chewing tobacco and excessive expectoration bring about digestive disturbances which indirectly cause constipation.

It is well known that in a line with what has just been said, the various diseases of the digestive system, gastric diseases, chronic enteritis, chronic ulceration of the small intestine, such as is found in tropical fever, and common in malarial, may all result in acute or chronic constipation. In ulceration of the stomach, where the pylorus is closed, or where it is closed in cancer, acute and chronic enteritis, and especially chronic stenosis of the pylorus, constipation is the result. While the first is caused by a closed or load ingested, and secondly by a narrowing of the passage through which it is poured out into the large intestine.

Acute and chronic enteritis, however, are more likely to result from a narrowing of the passage by which it passes away, leaving the intestine in a state of chronic inflammation, and the reflex excitability is increased. In chronic enteritis the mucosa of the walls of the

Intense inflammation and ulceration high up in the intestinal tract often result in constipation, as is the case when corrosive substances have been swallowed.

Diseases of the liver and pancreas may produce constipation through a modification of their secretions or an inhibition of peristaltic movements due to the pains which they induce. Hinrichs (Inaugural Dissertation, Berlin, 1889) stated that diseases of the pancreas are very frequent causes, and that they greatly increase the suffering. Johnston stated that occlusion of the pancreatic duct, either by calculi or catarrhal diseases, frequently results in a fatty diarrhœa, but that pancreatitis causes constipation. Inflammation of the liver, the gall-bladder, or any of the biliary ducts through the suppression or reduction in the amount of bile, or alteration in its quality, no doubt results in this condition and induces a type ordinarily called biliousness. The inflammation of any of these organs ordinarily affects the peritonæum covering them, and consequently produces a certain amount of peritonitis which is likely to extend in all directions, involving the intestinal coat, and this contributes also to inactivity of the bowels.

Circulatory and Chronic Diseases.—Chronic diseases of the heart, liver, and lungs are frequently the causes of constipation by their general influence in the production of muscular weakness, decreased glandular secretion, and imperfect oxygenation. In cases of lung and heart diseases in which exercise is prohibited, the respiratory movements are limited, the abdominal and diaphragmatic muscles are weakened, and constipation results.

Diseases of the Nervous System.—It is a question open to discussion whether constipation of the insane is due to defective innervation of the intestinal tract or to lack of sufficient mental power for proper attention to the calls of Nature. It is one of the most frequent symptoms in all forms of chronic insanity, senile dementia, and progressive myelitis.

In acute meningitis and encephalitis it also frequently occurs. In the latter and in myelitis it is probably due to an interference with the motor nerve-fibers. In meningitis and tetanus it is said that the muscles of the intestinal and abdominal walls are in a state of tonic contraction, and therefore the accompanying constipation is due to a sort of enterospasm. In multiple sclerosis of the spinal cord it is a very frequent complication, and is associated with mucous colitis in many instances. In those patients with sufficient intelligence to remember their habits, a considerable number of them have reported that they had suffered from constipation before their nervous symptoms developed. A certain proportion of them were perfectly sure that their bowels had always been regular until after the nervous disease set in.

As a matter of fact, however, in all of these patients the change of environment, habits, and dietary at the time, or after the beginning of their nervous symptoms, might account in a degree for their constipation. These facts, however, do not explain the occurrence of constipation in almost every case of ataxia, and in individuals with whom there has been no change of circumstances, environments, or dietary. Whether the sympathetic ganglia and the plexus of Auerbach and Meissner take part in the sclerotic process or not, or whether it is simply an involvement of the cerebro-spinal nerve-roots and centers which control the inhibition of the circular muscular fibers, is not known; but constipation is nearly always an accompaniment of the disease, and all remedies directed toward it are of only temporary benefit unless there is concomitant improvement in the nervous condition.

Under this heading one may group that type of constipation termed spastic, and due, according to Rosenheim (*Pathol. u. Therap. der Krankh. des Darmes*, 1893), Kaczorowski (*Deutsche med. Wochenschrift*, 1882, No. 1), and Illoway (*op. cit.*, p. 88), to enterospasm.

It is due to partial or general tonic contraction of the muscles of the intestine, the circular and longitudinal fibers contracting synchronously and persistently, and thus preventing any movement of the fecal mass.

It is said to be frequent in basilar meningitis and pathological processes that produce pressure upon the pons or medulla oblongata, and in lead-poisoning.

The partial type of enterospasm is frequent in acute gastritis and intestinal indigestion, and, according to Rosenthal, may be produced by chronic gastric catarrh. The same author speaks of this condition as "crises enteriques" occurring in the course of tabes dorsalis. The constipation in this type of cases, as can be readily understood, is a matter of no importance compared with the general condition which produces it. It increases or decreases, following the course of the disease of which it is a symptom, and needs no therapy of its own. Enterospasm occurs during the course of neurasthenia, hysteria, and acute nervous excitement. In such instances the management of the neurosis is the part of the physician; the constipation will take care of itself.

Illoway states that partial enterospasm may be associated with atony of the intestinal muscles, which opinion seems to be corroborated by Reynolds's System of Medicine, Rosenheim (*op. cit.*), Fleiner (*Berliner klin. Wochenschrift*, January, 1893), and Charchewski (*Revue de méd.*, October and December, 1883). He includes spasmodic stricture of the rectum and contraction of the sphincter ani as types of enterospasm. These conditions, however, being due in the large majority of cases to local causes, can not be properly included in this category.

Local and Mechanical Causes.—There are causes which act in a mechanical manner by offering an obstruction at some point or other of the intestinal tract to the passage of the fæcal mass. The constipation produced by these has been termed *obstipation*. The impression has gone abroad in certain sections that this term is applied only to those obstructions found in the rectum, particularly those produced by inflammation, hypertrophy, or malformation of Houston's valves. Such is not the case. *Obstipation* consists in a mechanical obstruction to the passage of fæcal matter at any portion of the intestinal canal.

In children it is frequently due to the imperfect absorption of the sæptum dividing the rectum and the anus in foetal life, to malformations in the rectum itself, and to imperfect development of the intestinal tract either above or below the cæcal valve. It may also be due to abnormal development of the sigmoid flexure and colon, both in their circumference and length, to sacculation in the large intestine, or to true diverticuli, as has been pointed out by Treves and Osler (*Annals of Anatomy and Surgery*, Brooklyn, 1881). Diaphragms or folds of mucous membrane sometimes project into the lumen of the bowel and reduce the size of the passage to a greater or less degree. These diaphragms more frequently occur in the lower portion of the intestinal canal, the rectum, and sigmoid flexure, but they also occur in the upper portion of the colon and in the small intestine, as has been pointed out by Illoy (op. cit., p. 78).

Martin, in his little work *Obstipation*, attempts to prove that the rectal valves or Houston's folds are the cause of constipation in the large majority of cases. After demonstrating the existence of the folds, which were described by Houston, Kohlrausch, and Otis, he says: "It may be the special property of the valves in certain abnormal conditions to maliciously obstruct the descent of the fæces." He describes three forms of valvular obstruction, as follows: "First, the anatomic coarctation of the valves may afford an exaggerated physiologic resistance to the descent of the fæces. Second, congenital hyperplasia of the rectal valves is a condition classically described as diaphragmatic stricture or membranous sæptum in the abdominal rectum. Third, hypertrophy of the rectal valves constitutes the classical, annular stricture of the abdominal rectum."

With regard to his first proposition, no one who admits the existence of the folds as anatomical structures can deny the possibility of their retarding the descent of the fæces when they are abnormally developed. The writer has studied this subject in an unprejudiced manner with a mind open to conviction from every point of view. Hundreds of cases, in many of which the valves were markedly developed, and overlapped each other, have been examined, and yet no case has

been seen in which anything more than a small particle of faeces has been arrested above one of these valves. They have been as well marked in many cases which did not suffer the least from constipation as they were in constipated individuals. Nineteen valvotomies have been performed, always following the direction of Martin, viz., that a hooked probe introduced into the center of the valve shall not slide over its edges when drawn downward, thus demonstrating the obstructive quality of the valve according to his theory; of these 19 cases, 7 were operated upon by incision—according to the methods of Martin—and 12 by the Pennington clip. In all of the cases a certain amount of benefit was obtained for two or three months, but after this time, as the patients discontinued the hygienic regimen and local treatment necessary to the healing of the incised valve, the old symptoms returned to a greater or less degree. Permanent relief was accomplished by the operation in only 2 or possibly 4 cases. No ill effects, however, such as stricture, protracted ulceration, or inflammation, have followed the operation in any of these cases. Reasoning from the anatomical conformation of the parts, and from some post-mortem specimens which have been observed—for example, the one from which Fig. 25 is taken—the opinion results that obstipation from this cause may occur, but clinical experience does not prove that it is the etiological factor in any great number of cases. As to his second and third propositions, that congenital hyperplasia of the rectal valve is what is ordinarily known as diaphragmatic stricture or membranous septum of the rectum, and that hypertrophy of these valves constitutes annular stricture of the rectum, a general denial must be entered. In the first place, diaphragmatic strictures and membranous septa occur at no regular locations except at the juncture of the rectum with the anus, entirely below the site of any of the valves; in the second place, the compositions of such septa are entirely different from those of the valves; and in the third place, the classical, annular stricture of the rectum has neither the shape, conformation, nor anatomical structure of an hypertrophied valve. Hypertrophy of the valve does not cause it to extend entirely around the rectum, but simply increases its anatomical constituents in the original site. The classical, annular stricture of the rectum entirely surrounds this organ, and is ordinarily as thick in one portion of the circumference as it is in another; again, the annular stricture is composed almost entirely of fibrous material covered by mucous membrane, and is developed from the submucosa. Hypertrophy of the rectal valve consists in thickening of the mucous membrane, an increase of the normal constituents of the submucosa, and hypertrophy of the muscular wall of the gut.

While, therefore, the *possibility* is admitted that abnormally developed or hypertrophied valves may produce an obstruction to the passage

of the fæcal mass, it is not conceded that either hypertrophy or hyperplasia of these valves constitutes the diaphragmatic or annular stricture of the rectum. This view is sustained by the elaborate studies of hypertrophied valves by Pennington and Edwards (Jour. Amer. Med. Ass'n, December, 1900). A brief account of their observations is as follows:

"*Mucosa*.—The mucosa showed epithelial glands containing a very large percentage of goblet-cells. No other pathological process was demonstrated in these structures. They were slightly hypertrophied. There was nothing to indicate an atrophic process in the mucosa, at least at this time. Between the glands there was an increase of tissue which was generally round-cells, though some spindle-cells and young fibers were apparent. In two of the specimens there was evident local infection with a pus organism, the focus extending into the submucosa. The muscularis mucosa was thickened.

"*Submucosa*.—The submucosa showed a great increase in the connective tissue, which was in bundles. These bundles usually ran across the long axis of the valve. There was extensive thickening of the blood-vessel walls. This thickening was the usual type of endarteritis obliterans. The sections removed from the valves in live subjects showed no muscle except a very few circular fibers.

"In a section made from a cadaver, in which the valves were coarse and resistant, the following were found: the circular muscular layer was generally hypertrophied; the longitudinal layer showed slight hypertrophy, and the adventitia external to the muscular layer showed an increase of white fibrous tissue together with an extensive endarteritis obliterans."

From these examinations it will be seen that there was no evidence whatever of cicatricial material, such as goes to make up the ordinary annular stricture. On the other hand, while these cases are said to have been the victims of constipation along with colitis, there is no proof that the colitis and proctitis, together with hypertrophy of the valves, were not produced by the retention of hardened fæcal masses in the rectum.

This idea that constipation is caused by the rectal valves or folds is not at all new. Renauldin (Dict. des sciences méd., 1813, vol. vi, p. 257), Copeland, Kohlrausch, and Quain (Diseases of the Rectum, 1854) all describe cases in which these diaphragms or folds have resulted in the partial or complete obstruction of fæcal passages. There is therefore no doubt that when they are abnormally developed or malformed, as in the case of Renauldin, the folds may become obstructive, but such cases are rare.

Malformations.—The cases of Renauldin and others which have been referred to above may be more properly classified among the malforma-

tions of the rectum; with them one may include other malformations, such as congenital arrests of development, unusual narrowness at the cæcal valve, and partial atresia of the anus.

A child who presented all the symptoms of a chronic constipation, with recurrent appendicitis, was seen, in whom, upon opening the abdomen, there was no appendicitis whatever, but a congenital narrowing of the cæcal valve and of the ileum for two feet above its entrance into the cæcum. To the eye there was an absence of muscular development in the small intestine at this point. The Bauhinian valve was so tight that a very small fæcal mass pushed forward through the narrow ileum failed to pass. By the use of the finger and invagination of the small intestine through the valve, the latter was divulsed, after which the mass passed with ease. The vermiform appendix was removed, but it was not diseased. Since the operation the patient's bowels have moved

regularly, and his health has greatly improved. The chief cause of constipation in this patient was the abnormal narrowness of the ileo-cæcal valve and imperfect development of the ileum.

Nothnagel (*Beiträge zur Physiol. u. des Darmes*, Berlin, 1884) describes a condition which he calls congenital hyperplasia of the colon. The patient in whom it was observed gave the history of constipation from infancy. There was an immense development of the colon and large accumulations of fæcal material in it. The interesting case of



FIG. 178.—MALFORMATION OF THE SIGMOID FLEXURE.

Futterer and Mittendorf exhibits a remarkable dilatation or diverticulum of the sigmoid flexure removed from a boy fourteen years of age in which constipation was the most marked symptom (Fig. 178, *Illoway, op. cit.*, p. 77). Such instances are curiosities, but less marked diverticuli of the intestine are by no means unique, and they, too, cause constipation.

Enteroptosis.—Displacements of the intestines are not infrequent causes of constipation. Rosenheim claims that the most frequent displacement of the large intestine takes place at the hepatic flexure. This, however, is not the experience of a large majority of observers.

Prolapse of the transverse colon is the most frequent type; it is carried along with the stomach in many cases of gastropptosis. In such the colon forms a loop representing somewhat an inverted U or M. The fæcal material after it has passed the hepatic flexure drops down into the loop and must be again lifted directly upward against the force of gravity, as has been before described, and consequently there is an obstruction to its passage. Persons with this condition invariably suffer from a greater or less degree of chronic constipation; and when the bowels and stomach are lifted up into their proper places and held so by properly adjusted bandages, the constipation is materially relieved.



FIG. 179.—ACUTE FLEXURE OF THE SIGMOID ON THE RECTUM. (From photograph by Pennington.)

Acute Flexures. — One of the chief causes of constipation, and one to which more importance is attached than to any other form of mechanical obstruction except stricture, is acute flexure between the rectum and sigmoid. In the normal condition the empty sigmoid lies in the pelvis between the rectum and bladder or uterus, thus causing an acute flexure between these two organs (chapter on Anatomy). In cases of pelvic inflammation, peritonitis, or cellulitis, it not infrequently happens that it becomes adherent to the rectum or to the floor of the pelvis, thus becoming limited in its motions and prevented from rising up into the abdominal cavity, thus straightening out the tract between it and the rectum (Figs. 179 and 180). Under such circumstances an obstruction to the passage of the fæcal mass at this flexure is inevitable.

This condition can be demonstrated by the use of the pneumatic sigmoidoscope. Where the pelvic colon is normally mobile, inflation will cause it to rise up into the abdominal cavity and allow the straight tube to pass easily into the canal. When, however, on account of such adhesions, obstructions in the shape of tumors, or too short a meso-sigmoid, this flexure can not be straightened out, it is with the greatest

difficulty, and sometimes even impossible, for one to introduce a tube of even moderate size beyond the recto-sigmoidal juncture.

In one case operated upon, the sigmoid was prevented from rising by the vermiform appendix passing downward across its anterior surface

and adhering to the peritonæum of the pelvis, just to one side of the bladder. Attempts were made during several months to introduce a straight tube into this woman's rectum, and they always caused great pain until after the vermiform appendix was loosened from its attachment and removed. As soon as this was done, the sigmoid sutured to the abdominal wall, and the patient had recovered from the immediate effects of the operation, it was possible to introduce the tube without any difficulty, and the patient's bowels moved without pain, an experience which she had not enjoyed for many years. A similar case to this, observed in a post mortem, is represented in Fig. 181. Adhesive bands from peritonitis occasionally pass across the pelvic cavity and interfere



FIG. 181.—ADHESION OF SIGMOID TO THE RECTUM, CAUSING ACUTE FLEXURE AT THEIR JUNCTION. (From photograph by Pennington.)

with the movement of the sigmoid flexure. There may be interference with this movement by the adhesion of appendices epiploicæ of the sigmoid to the pelvic wall. These adhesive bands not only obstruct the movement of the sigmoid flexure and thus cause constipation, but they also sometimes cross the pelvic colon, forming diverticuli above them, and thus occasion constipation by their actual obstruction of the canal. These flexures and adhesions are among the most frequent causes of obstinate constipation in women.

Spasm of the Sphincter.—Hypertrophy of the external sphincter and levator ani muscles are causes of constipation. Mathews lays great stress upon the influence of the external sphincter in the causation of this condition; he holds that the large majority of the cases of constipation arise from spasm or hypertrophy of this muscle, and states that in many of the cases in which constipation has been apparently relieved by operations upon hæmorrhoids, the real benefit has been derived from the divulsion of the sphincter. There is no doubt a large amount of truth in what he says upon this subject, but the cause of the hypertrophy or spasm of the muscle remains to be explained. It may be induced by pressure from a prolapsed uterus, tumors of the

pelvis, inflammation of the rectum, deep urethra, or bladder; other reflex disturbances may also occasion it, as will be seen in the chapter upon the neuroses of the rectum.

Fissure in ano or irritable ulcers—in fact, ulceration of any kind about the margin of the anus, or just within the rectum, will occasion it. Under such circumstances the fæcal movements are retarded or prevented by a twofold action. First, the actual obstruction caused by the sphincter; and second, the disinclination upon the part of the patient to have a movement which will occasion more or less distress. It is this fear in the first place which occasions the constipation in acute fissure, and when the fissure has once healed, the hypertrophy of the sphincter which has been occasioned by it comes in to play the part of obstructor to the passage. The levator ani muscle is also subject to similar irritations, and it may also play a part in the production of obstipation.

Spasm of the circular fibers of the intestine at the juncture of the sigmoid and rectum may have an influence in the production of constipation. O'Beirne and others have pointed out that whenever a bougie has once passed through this aperture it is very likely to be followed by a fæcal movement; it excites an inclination to go to stool, and upon a second examination a short time afterward one will almost invariably find an increased amount of



FIG. 181.—INFLAMMATORY ADHESION OF THE APPENDIX, BINDING THE SIGMOID TO THE ANTERIOR SURFACE OF THE SACRUM AND PREVENTING ITS RISING OUT OF THE PELVIC CAVITY.

fæces in the rectum, thus showing, according to his view, that the spasm of the circular fibers had prevented the descent of the fæces.

Foreign Bodies.—The presence of foreign bodies in the intestinal tract may also become the occasion of chronic or acute constipation.

The introduction of these bodies through the anus will usually result in an acute type; whereas those which are formed in the tract, such as concretions and enteroliths, are of slow development, and likely to result in chronic constipation and eventual obstruction. Certain foreign bodies which pass through the intestinal canal, having been swallowed, may also occasion this condition. The swallowing of false teeth has several times been reported as resulting in constipation. Prune-pits, fruit-seeds, gall-stones, and small particles of indigestible food have frequently formed the nucleus around which have accumulated the salts found in the intestinal contents, until they have produced large concretions or aggregations which obstruct the canal and thus occasion either chronic constipation or complete obstruction.

Masses of hair have been found obstructing the intestinal canal. Many suppose that these aggregations are dermoid cysts which have ruptured into the intestinal canal, but such is not the case. They are ordinarily found in patients who are in the habit of biting their hair or mustache and swallowing it; in one case a mass of this kind had formed just above the cæcal valve, measuring $5\frac{1}{2}$ inches in circumference and 8 inches in length. Another mass of this kind which was removed from the stomach measured 9 inches from end to end, and $4\frac{1}{2}$ inches in circumference in its widest part. In both of these cases the habit of biting the ends of the hair (which was worn in a braid) was clearly made out. Many other foreign bodies have been found to cause constipation, an interesting review of which will be found in Treves's work upon intestinal obstruction, and in the cases quoted by Illoway (*op. cit.*).

Extra-intestinal Obstructions.—Finally, as causes of constipation one should always bear in mind the fact that pressure may be exerted upon the intestines in any portion of their tract, and thus occasion retardation of the faecal current. Hydatids of the liver, tumors of the spleen, kidneys and stomach are nearly always associated with greater or less constipation, owing to their pressure upon the transverse or descending colon. Subinvolution and displacements of the uterus very frequently cause it. It is needless to mention the fact that a fibroid or ovarian tumor may occasion the same results. These conditions should always be diagnosed in any search for the causes of constipation, and no favorable prognosis can ever be offered so long as they exist.

With regard to strictures of the rectum and sigmoid, as has been described in the chapter upon that subject, they always produce a constipation at first, and afterward result in a combination of this condition with a nagging, teasing diarrhœa which masks the constipation. The diagnosis of these and the differentiation between the malignant and cicatricial type have been given in the chapters upon those subjects.

Intra-intestinal tumors, such as polypi, adenomata, papilloma, fibroma, etc., may all occasion constipation, but in the large majority of instances the efforts of Nature to rid herself of these neoplasms result in an increase of peristalsis and diarrhœa.

Intussusception and Prolapse.—Intussusception of the intestine in any portion of its extent results ordinarily in an acute obstruction. Illoway and Johnston both include it under the causes of constipation, and perhaps there are instances in which a mild degree of intussusception may result in an acute, temporary attack which is relieved either by the sloughing off of the intussuscepted portion of the gut or by the reduction of the intussusception. A case of this kind was reported to the writer in a private communication by Thomas, of Charleston, W. Va. The patient was seized on January 12, 1901, with a high temperature, intense pain and aching in the limbs and back, and a severe diarrhœa, which continued for ten days in spite of treatment. The patient suffered from great pain in the rectum, together with nausea, vomiting, and distention of the abdomen to such an extent that intestinal obstruction was feared. Under rectal irrigation the patient passed, at the end of five days, a section of bowel about 6 inches in length. Immediately after this the symptoms of obstruction subsided, and the patient gradually recovered. Thomas states that the section passed was a part of the sigmoid flexure, as he could see the circular line of granulation at the point where the gut sloughed off about 8 inches above the anus.

This condition is rarely so mild in its manifestations and symptoms as to be classed among the ordinary causes of constipation. On the other hand, that form of procidentia of the rectum termed prolapse of the third degree, which really consists in an intussusception of the upper portion of the rectum or sigmoid into the ampulla, is quite frequently productive of constipation. Patients suffering from this condition claim to be constipated, and yet their bowels thoroughly empty themselves at regular periods; the sensation of uncompleted defecation in these cases is caused by the pressure of the prolapsed or intussuscepted gut upon the sensitive margin of the anal aperture. This condition is discussed in the chapter on Prolapse of the Rectum.

Stone in the Bladder, Stricture, and Urethral Diseases.—Stone in the bladder, stricture, and urethral diseases may all result in constipation owing to reflex spasm and subsequent hypertrophy of the sphincter muscles. In the same way an enlarged prostate, both by its reflex influence and its pressure upon the rectum, may result in this condition.

Willy Meyer has reported (N. Y. Academy of Medicine, February, 1901) the fact that in his series of operations for enlarged prostate by the Bottini method he has seen several cases of obstinate constipation

relieved of that as well as of the dysuria. The author's experiences with that operation have not been so fortunate in the relief of the constipation.

DIAGNOSIS.—Constipation must be distinguished from faecal impaction and intestinal obstruction. Before deciding that either exists, one must determine that the patient's functional habits are abnormal. What constitutes constipation in one does not in another. Where a patient has regular and satisfactory movements without any local or constitutional disturbances, even if the periods are somewhat widely separated, it is to be presumed that this is normal, and the habit should not be interfered with.

Regularity without effort, and the discharge of faecal material proportionate to the amount of food consumed, are the essential requisites of normal defecation. The impairment of either of these features in the line of inadequate amounts, or prolonged retention requiring increased effort to obtain a passage, constitutes constipation. When these have been determined, a search for the cause in some one of the conditions which have been enumerated should be instituted. Careful inquiry, abdominal palpation, and digital and instrumental examination are all necessary to come to a proper diagnosis in such cases.

When one or more of these conditions has been shown to exist, they may be the cause, but in the local conditions about the lower end of the rectum one should be very careful in his prognosis as to the results of their cure upon the constipation, for frequently they are only complications and not its causes.

Between acute constipation, faecal impaction, and intestinal obstruction it is not always easy to draw the dividing line. They may all be brought about by the same causes, and produce in the beginning similar symptoms. In acute constipation there is at first simply an omission in the regular movements of the bowels, which may persist for an indefinite period without any marked symptoms. When constitutional symptoms develop they consist in some griping, lack of appetite, bad taste in the mouth, a little heaviness or disinclination to mental activity, and occasionally symptoms of autoinfection, such as elevated temperature, rapid pulse, and more or less aching pains over the body.

In impaction the patient may suffer from all of these symptoms, and yet at the same time have abnormally frequent passages. The author has known a patient to suffer from a continuous diarrhoea for six weeks, and finally develop acute mania with hallucinations and loss of memory, apparently from no other cause than an impaction of faeces in the sigmoid flexure. The impacted mass being lodged in a saccule or diverticulum of the colon or ampulla of the rectum, permits fluid stools to pass around or to one side of it. This causes an irritation, inducing

frequent stools, and thus the patient is often misled into the belief that he is suffering from diarrhœa. In simple constipation and in impaction there is always a channel for the escape of gases from the bowels. In complete obstruction the lumen of the gut is entirely occluded by organic changes in the caliber, by some foreign substance becoming impacted in a narrow portion of the channel, or by intussusception, volvulus, or acute flexure in the gut.

In obstruction the constitutional symptoms manifest themselves very early. The torminæ are severe, the abdomen distends, nausea and vomiting come on soon in the disease, the ejecta are at first fluid and bilious and afterward fæcal; the patient's pulse becomes very rapid and feeble; he has cold perspiration and general weakness, and after one or two enemas the fluid injected will return unstained by fæcal matter. The importance of an early distinction between these different conditions can not be overestimated. The utmost patience and dependence upon natural functions is requisite in the treatment of constipation; in fæcal impaction repeated enemas, fæcal solvents, and gentle distention of the gut by air is advisable, rather than to undertake radical surgical operations. If the mass is within reach from the rectum, anæsthetization and breaking it up are justifiable, but too great haste may be exercised in this.

In intestinal obstruction, however, prolonged manipulation and efforts to overcome the condition by enemas, inflations of the intestine, and therapeutic remedies are not only useless but seriously jeopardize the patient's life. Radical measures must be undertaken at once, either through the formation of an artificial anus above the point of obstruction or by the removal of the obstructing cause. In order for this to prove successful, the diagnosis and operation must be done early in the obstruction. A close study of the symptoms is therefore of paramount importance.

Thus far we have discussed those features common to both the acute and chronic forms of constipation. In the consideration of symptoms and treatment we must separate the two.

Acute Constipation.—Acute constipation is a temporary interruption of the normal activity of the bowels usually produced by functional rather than mechanical causes. It occurs in the course of acute constitutional and infectious diseases, or during periods of excitement, great mental strain, changes in business or environment, and in travel where the conveniences are poor, and the diet, water, and habits of life are irregular and changeable.

Symptoms.—In a few cases the omission of a stool causes a certain amount of inconvenience, but in the large majority an interruption of one, two, or three days may take place without any serious disturbances. The symptoms, when any are aroused by such an omission, consist in

slight heaviness about the sacrum, heat and fulness in the rectum or pelvis, and more or less hebetude. When the bowels move after the interruption, the mass may be perfectly normal or it may be hard and lumpy, requiring effort to pass it; the quantity expelled is ordinarily much larger than normal, and frequently the first stool is followed by two or three smaller ones before the sigmoid and rectum are emptied. The feeling of fulness and tenderness in the rectum and anus may remain for some time after the first movement, and an examination at this time will demonstrate a congestion of the hæmorrhoidal veins and an œdematous condition of the muco-cutaneous tissue around the anus. All of these symptoms may disappear spontaneously, or it may be necessary to flush the colon and have recourse to purgative medicines before they are relieved. Elevation of temperature and accelerated pulse-rate are frequently but not invariably present in acute constipation. There may be tenesmus or violent paroxysms of pain, and occasionally symptoms of obstruction, but these symptoms are rare except in cases with organic obstructions. Volvulus or intussusception may also produce them. In simple acute constipation they all subside, and the patient is relieved as soon as a good fæcal movement is obtained.

Habitual negligence of the calls of Nature and recurrent attacks of acute constipation result in a decrease of sensibility and atony or loss of expulsive power in the rectum which ends in the chronic form.

Treatment.—When the condition develops suddenly and has only lasted for a day or two in patients whose bowels have previously been regular, it is ordinarily wise not to interfere too actively at first. Especially is this true where mental absorption or changes in habits or environment account for the condition; such cases almost invariably right themselves. But when there are symptoms like headache, sleepiness, tympanites, pain in the back, in the inguinal regions, or about the anus, then it becomes necessary to move the bowels. If a simple enema does not relieve the symptoms at once, a rectal and sigmoidal examination should always be made to determine whether foreign bodies or mechanical obstructions are present. When it is simple constipation the enema should be repeated, and after all the hardened fæcal masses in the rectum and sigmoid flexure are removed, some mild laxative may be given in order to stimulate the peristaltic action of the small intestine and upper colon, and thus empty them. There is nothing better in these acute cases than minute doses of calomel, one-tenth to one-fourth of a grain, with bicarbonate of soda in triturate tablets; the one-tenth-grain tablets may be repeated every half hour, or the one-fourth-grain every hour until the bowels have been moved. Neither should be continued longer than eight hours.

Another remedy which has acted well in such cases has been sulphate of magnesia one ounce, and bicarbonate of soda one dram dissolved in four ounces of water; a tablespoonful of this is given every half hour until the bowels move.

Rochelle salts, citrate of magnesia, Seidlitz powders, phosphate of soda, and the various saline waters may also be used, but the above simple remedies will ordinarily effect just as good results as the most complicated aperients. Where there is tenesmus, tympanites, pain, and griping, hot applications to the abdominal wall often give great relief; and occasionally the constipation yields to a full dose of morphine administered hypodermically, thus indicating the spasmodic nature of the condition. When a low enema is given by an ordinary syringe and fails to produce a fæcal movement, long rectal tubes (24 to 30 inches in length) may be introduced, with the patient's hips elevated and his shoulders lowered so as to allow large quantities of water to flow slowly into the colon. In this way as much as 4, 6, or even 10 pints of water may be introduced, and distressing symptoms are relieved either by the loosening up of an impacted fæcal mass, or possibly by the undoing of a volvulus or intussusception. The syringe holding the water should be elevated not more than 2 feet above the patient's body, so that the fluid will run in very slowly. A little turpentine and milk of asafœtida may be added to the injection, and they will materially aid in stimulating peristalsis. In one case of acute constipation it was possible to give immediate relief by the lifting up of a subinvolted uterus which had through a sudden jolt been carried downward and backward, and become impacted against the sacrum, thus occluding the rectum. With a Sims's uterine repositor the organ was lifted into position, not without some pain, however, and within a short time a full and free action of the bowels resulted. Another case of this kind was relieved by the evacuation of a large hæmatocele which developed in the pelvic cavity and thus practically occluded the rectum. Large abscesses, either of the ischio-rectal fossæ or the superior pelvi-rectal spaces, may occasion acute constipation, which salines and other laxatives aggravate rather than relieve. The evacuation of the abscess cavity results in immediate relief. Acute inflammation and spasm of the bowels may produce a temporary constipation, but ordinarily it is of very short duration, and soon resolves itself into a diarrhœa. Morphine relieves these cases. The slowly acting cathartics are not advisable in this variety of constipation.

CHRONIC CONSTIPATION.—Chronic constipation consists in inadequate or abnormally infrequent fæcal passages, and prolonged retention of the fæcal materials in the intestinal canal. It occurs at all ages, in every class, and is produced by a variety of causes, as has been shown.

Symptoms.—The typical symptoms in chronic constipation are gradually increasing periods between the faecal movements, associated with progressive hardening of the faecal mass, and decreasing desire to defecate. In the beginning there are ordinarily no constitutional symptoms; the patient simply notices that his stools are smaller, harder, drier, in lumps of various sizes, and generally of a dark-brown or greenish-black color. Later on he will observe, perhaps, that these masses are coated with mucus, which may or may not be tinged with blood. Frequently gelatinous masses of coagulated mucus will precede or follow the faecal mass, and sometimes one will observe in such passages particles of undigested food, like pieces of meat, fruit or vegetable material, and foreign substances.

When this condition has existed for a greater or less period, symptoms of indigestion appear; there are flatulence, lack of appetite, coated tongue, distention of the abdomen, and gaseous eructations. The tongue is usually pale, flabby, furred with white in the middle, and indented by the teeth at its edges; headache, drowsiness, and mental lethargy gradually come on; the patient's rest is broken by bad dreams, and he may gradually lose flesh and strength. Palpitation of the heart, dyspnoea, and occasionally vertigo and dizziness, accompany the condition. There may be disturbances of vision, tinnitus aurium, cardialgia (Melhose, Hufeland's J., 1841, Bd. xcii, S. 105), and various reflex symptoms, as follows:

Uro-genital Symptoms.—Constipation is frequently the cause of urinary disturbances through pressure of the faecal mass upon the ureters, the neck of the bladder, or the prostatic urethra; suppression of urine is said to have been occasioned by it (Barnwell, Cincinnati Med. News, 1875, p. 553). In chronic cases the urine is increased in quantity, the color is darker, and the solid constituents are increased; it is often loaded with urates, but oxaluria is one of the most constant features. Occasionally cases are seen in which there is an excessive secretion of urine with low specific gravity and clear limpid color. In these cases there is no evidence of glycosuria, and it is reasonable to suppose that the symptoms are purely reflex.

In young women constipation is frequently the cause of catamenial disturbances, hysteria, and chlorosis. That which is often described as chlorosis or anæmia is nothing more than auto-intoxication due to the prolonged retention of faecal material in the intestinal canal. Anteflexion and painful menstruation (Thomas), together with chronic inflammation of the uterus and its appendages, may all be caused by the protracted retention of faecal masses in the sigmoid and rectum.

Constitutional Effects.—Muscular rheumatism, stiffness of the joints, and lack of tone in the general system sometimes result from prolonged

retention of fæcal matter in the intestine. The hair and finger nails become dry and brittle, the skin is sallow, covered with silvery, scaly epithelium, or is often wrinkled and parchment-like. Sometimes there is acne, prurigo, urticaria, or furunculosis.

Alterations in bodily temperature are not so frequently associated with chronic as with acute constipation; there are persons who, upon the omission of one day's fæcal movement, will develop an elevation of bodily temperature of 3 or 4 degrees, and children, from no other apparent cause than accumulation of fæces in the intestinal canal, will have temperatures of 104° to 106° Fahr.

General practitioners have frequently observed the fact that in the course of continued fevers the temperature will be elevated when the bowels have not been moved for two or three days, and it is a constant experience in hospitals that the temperature of surgical cases will gradually rise after operative procedures until the bowels have been moved, when it will drop to normal, and remain so during the whole course of convalescence. Johnston (*Lancet*, London, 1879, vol. ii, p. 229) has recorded a case in which there was a temperature of 104.0°, pulse 180, and a delirium due to accumulated fæces in the intestinal tract. Barnes (*Med. Press and Circular*, 1879, p. 477), Cabot and Warren (*Boston Med. and Surg. Jour.*, 1880, p. 1571) have also reported cases in which there was great elevation of temperature due to fæcal accumulations. The explanation of these phenomena lies in some influence upon the heat center through auto-intoxication or irritation of the mucous membrane.

Nervous and Mental Symptoms.—In children, either acute or chronic constipation may result in severe nervous phenomena, such as St. Vitus's dance, epilepsy, and convulsions. In nervous and mental diseases of adults, chronic constipation is one of the most frequent complications. In hypochondria and melancholia it is almost always present, and may act as an exciting cause through the depressing effect of the accumulated fæcal material, the auto-intoxication from its putrefaction, and also through the overestimation upon the part of the individual of the necessity of daily fæcal movements. As has been said, this "daily movement" becomes the subject of unceasing thought and anxiety. Pulitzer (*Wien. med. Presse*, 1866, S. 439) and Dujardin-Beaumetz (*Bull. de therapeut.*, Paris, 1875, p. 179) have called attention to serious hallucinations and loss of consciousness in individuals suffering from constipation. Mattei (*Bull. de l'acad. de méd.*, vol. xxx, p. 870) has reported a case of aphasia due to constipation and fæcal accumulation. Every alienist has probably seen cases of temporary mental derangement associated with fæcal retention. The following interesting instance of this occurred in the author's practice;

Mr. A. T., lawyer, patient of Dr. Frederick Peterson, had been suffering from delusions, hallucinations, and partial unconsciousness for several weeks without any apparent cerebral disease to account for the same. His attack had begun in a diarrhoea with severe pains and tenesmus, which continued more or less persistently except when he was under the influence of opiates. This pain was at first referred to the lower portion of the abdomen and to the rectum. An examination with the pneumatic proctoscope established the presence of an impacted faecal mass in the sigmoid flexure, together with a small ulceration at the juncture of the rectum with the sigmoid. The faecal mass was loosened and removed by the use of solutions of ox-gall and oil, together with pneumatic distention of the bowel. Within a few days the patient's mental condition cleared up and he became perfectly rational.

Such conditions are doubtless due to an alteration of the blood resulting from the absorption of gases and putrefactive materials from the intestine. Vösch, quoted by Johnston (*Pepper's System of Medicine*, vol. ii, p. 647), has reported 10 cases of suicide in which there were displacements of the colon and evidences of chronic constipation. He also quotes Laudenberger of Stuttgart, who observed that in 94 autopsies of insane individuals, one-seventh suffered from constipation and displacements of the transverse colon.

Treatment.—The treatment of any individual case of constipation will depend upon its cause. In children it is ordinarily due to malformation, unnatural diet, or some local disease of the rectum and anus, the pain of which causes them to avoid having movements. Malformations usually will manifest themselves in the first few days of infant life, and should be remedied in accordance with the methods before described (see chapter on Malformations).

Every accoucheur when he delivers a child should make it a practice to introduce his finger into the infant's anus, and determine whether the connection between it and the rectum has been perfectly established or not. It does the child no harm to dilate the sphincter slightly at this time; it stimulates the respirations, gives vent to the accumulated meconium, and also relieves the physician of any responsibility as to future accidents through the possible malformation of these parts.

In breast-fed children there will be less danger of constipation than in those brought up by the bottle. In these days of modified milk and artificial foods, it is presumed that the mother's milk is absolutely duplicated. There is a difference, however, between normal breast milk and chemically prepared reproductions of the same, which science has been unable to solve, and while many infants are raised to a strong and healthy childhood upon cow's milk and its modifications, it is very frequently found more than difficult to regulate their bowels and prevent constipation and diarrhoea under this regimen.

In many books on pædiatrics it is taught that the mother should place the child upon a vessel at a certain hour every day in order to establish the habit of fæcal movements at certain periods. The establishment of such a habit is devoutly to be desired, but this method of doing it is a most fruitful source of fissures, hæmorrhoids, and prolapsus of the rectum. If, in order to bring about a daily stool, it is necessary to stimulate the mucous membrane of the intestine, it is better to give the child a small enema of cold water at a certain hour every day. Ordinarily in bottle-fed infants the constipation is due to a lack of sugar in the food; this may be relieved by adding certain quantities of sugar of milk to it. Sometimes a lack of oil or richness in the milk will occasion it; in such cases an increase in the cream will frequently overcome the constipation and regulate the child's bowels. The addition of lime-water to milk for feeding children is very likely to result in constipation. The prolonged use of bismuth and such salts in the treatment of summer diarrhœa is also likely to develop it, and should always be followed by a laxative in order to clean these substances out of the intestinal canal after the diarrhœa is under control.

The use of castile-soap bougies or cones often stimulates a child's bowels to movement in cases with a tendency toward constipation, and if they are carefully introduced no harm is likely to follow; in fact, they are among the best remedies. After children have begun to eat solid food, the regulation of their diet is ordinarily all that is necessary to overcome the condition. The modern refinement of foods has a tendency toward the production of constipation in that it removes all the indigestible and rough portions, thus taking away one of the chief elements in the stimulation of peristaltic action in the bowels. Feeding upon white bread, prepared starch, predigested foods, arrow-root, and such substances as have no indigestible material is a most prolific cause of constipation in children from one to seven years of age. Oatmeal and cracked wheat in moderate quantities, together with a little sugar and milk, are most excellent foods for children, in that they furnish an adequate amount of roughness to stimulate the bowels to normal action. Fruits are useful, but they have too great a tendency to produce fermentation, and consequently diarrhœa. After the age of three to four years a diet containing a reasonable amount of waste, cold baths, massage to the abdomen, and outdoor exercise are the best methods of avoiding or treating constipation. There is nothing like a brisk run in the fresh air, with full, deep respirations and chest movements, to induce a normal action of the bowels. Cold baths are also very stimulating to peristaltic action; at the same time that the bath is given thorough rubbing and massage of the abdominal walls,

The introduction of these bodies through the anus will usually result in an acute type; whereas those which are formed in the tract, such as concretions and enteroliths, are of slow development, and likely to result in chronic constipation and eventual obstruction. Certain foreign bodies which pass through the intestinal canal, having been swallowed, may also occasion this condition. The swallowing of false teeth has several times been reported as resulting in constipation. Prune-pits, fruit-seeds, gall-stones, and small particles of indigestible food have frequently formed the nucleus around which have accumulated the salts found in the intestinal contents, until they have produced large concretions or aggregations which obstruct the canal and thus occasion either chronic constipation or complete obstruction.

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Intra-intestinal tumors, such as polypi, adenomata, papilloma, fibroma, etc., may all occasion constipation, but in the large majority of instances the efforts of Nature to rid herself of these neoplasms result in an increase of peristalsis and diarrhœa.

Intussusception and Prolapse.—Intussusception of the intestine in any portion of its extent results ordinarily in an acute obstruction. Illoyay and Johnston both include it under the causes of constipation, and perhaps there are instances in which a mild degree of intussusception may result in an acute, temporary attack which is relieved either by the sloughing off of the intussuscepted portion of the gut or by the reduction of the intussusception. A case of this kind was reported to the writer in a private communication by Thomas, of Charleston, W. Va. The patient was seized on January 12, 1901, with a high temperature, intense pain and aching in the limbs and back, and a severe diarrhœa, which continued for ten days in spite of treatment. The patient suffered from great pain in the rectum, together with nausea, vomiting, and distention of the abdomen to such an extent that intestinal obstruction was feared. Under rectal irrigation the patient passed, at the end of five days, a section of bowel about 6 inches in length. Immediately after this the symptoms of obstruction subsided, and the patient gradually recovered. Thomas states that the section passed was a part of the sigmoid flexure, as he could see the circular line of granulation at the point where the gut sloughed off about 8 inches above the anus.

This condition is rarely so mild in its manifestations and symptoms as to be classed among the ordinary causes of constipation. On the other hand, that form of procidentia of the rectum termed prolapse of the third degree, which really consists in an intussusception of the upper portion of the rectum or sigmoid into the ampulla, is quite frequently productive of constipation. Patients suffering from this condition claim to be constipated, and yet their bowels thoroughly empty themselves at regular periods; the sensation of uncompleted defecation in these cases is caused by the pressure of the prolapsed or intussuscepted gut upon the sensitive margin of the anal aperture. This condition is discussed in the chapter on Prolapse of the Rectum.

Stone in the Bladder, Stricture, and Urethral Diseases.—Stone in the bladder, stricture, and urethral diseases may all result in constipation owing to reflex spasm and subsequent hypertrophy of the sphincter muscles. In the same way an enlarged prostate, both by its reflex influence and its pressure upon the rectum, may result in this condition.

Willy Meyer has reported (N. Y. Academy of Medicine, February, 1901) the fact that in his series of operations for enlarged prostate by the Bottini method he has seen several cases of obstinate constipation

relieved of that as well as of the dysuria. The author's experiences with that operation have not been so fortunate in the relief of the constipation.

DIAGNOSIS.—Constipation must be distinguished from faecal impaction and intestinal obstruction. Before deciding that either exists, one must determine that the patient's functional habits are abnormal. What constitutes constipation in one does not in another. Where a patient has regular and satisfactory movements without any local or constitutional disturbances, even if the periods are somewhat widely separated, it is to be presumed that this is normal, and the habit should not be interfered with.

Regularity without effort, and the discharge of faecal material proportionate to the amount of food consumed, are the essential requisites of normal defecation. The impairment of either of these features in the line of inadequate amounts, or prolonged retention requiring increased effort to obtain a passage, constitutes constipation. When these have been determined, a search for the cause in some one of the conditions which have been enumerated should be instituted. Careful inquiry, abdominal palpation, and digital and instrumental examination are all necessary to come to a proper diagnosis in such cases.

When one or more of these conditions has been shown to exist, they may be the cause, but in the local conditions about the lower end of the rectum one should be very careful in his prognosis as to the results of their cure upon the constipation, for frequently they are only complications and not its causes.

Between acute constipation, faecal impaction, and intestinal obstruction it is not always easy to draw the dividing line. They may all be brought about by the same causes, and produce in the beginning similar symptoms. In acute constipation there is at first simply an omission in the regular movements of the bowels, which may persist for an indefinite period without any marked symptoms. When constitutional symptoms develop they consist in some griping, lack of appetite, bad taste in the mouth, a little heaviness or disinclination to mental activity, and occasionally symptoms of autoinfection, such as elevated temperature, rapid pulse, and more or less aching pains over the body.

In impaction the patient may suffer from all of these symptoms, and yet at the same time have abnormally frequent passages. The author has known a patient to suffer from a continuous diarrhoea for six weeks, and finally develop acute mania with hallucinations and loss of memory, apparently from no other cause than an impaction of faeces in the sigmoid flexure. The impacted mass being lodged in a sacculi or diverticulum of the colon or ampulla of the rectum, permits fluid stools to pass around or to one side of it. This causes an irritation, inducing

frequent stools, and thus the patient is often misled into the belief that he is suffering from diarrhœa. In simple constipation and in impaction there is always a channel for the escape of gases from the bowels. In complete obstruction the lumen of the gut is entirely occluded by organic changes in the caliber, by some foreign substance becoming impacted in a narrow portion of the channel, or by intussusception, volvulus, or acute flexure in the gut.

In obstruction the constitutional symptoms manifest themselves very early. The torminæ are severe, the abdomen distends, nausea and vomiting come on soon in the disease, the ejecta are at first fluid and bilious and afterward fæcal; the patient's pulse becomes very rapid and feeble; he has cold perspiration and general weakness, and after one or two enemata the fluid injected will return unstained by fæcal matter. The importance of an early distinction between these different conditions can not be overestimated. The utmost patience and dependence upon natural functions is requisite in the treatment of constipation; in fæcal impaction repeated enemata, fæcal solvents, and gentle distention of the gut by air is advisable, rather than to undertake radical surgical operations. If the mass is within reach from the rectum, anæsthetization and breaking it up are justifiable, but too great haste may be exercised in this.

In intestinal obstruction, however, prolonged manipulation and efforts to overcome the condition by enemata, inflations of the intestine, and therapeutic remedies are not only useless but seriously jeopardize the patient's life. Radical measures must be undertaken at once, either through the formation of an artificial anus above the point of obstruction or by the removal of the obstructing cause. In order for this to prove successful, the diagnosis and operation must be done early in the obstruction. A close study of the symptoms is therefore of paramount importance.

Thus far we have discussed those features common to both the acute and chronic forms of constipation. In the consideration of symptoms and treatment we must separate the two.

Acute Constipation.—Acute constipation is a temporary interruption of the normal activity of the bowels usually produced by functional rather than mechanical causes. It occurs in the course of acute constitutional and infectious diseases, or during periods of excitement, great mental strain, changes in business or environment, and in travel where the conveniences are poor, and the diet, water, and habits of life are irregular and changeable.

Symptoms.—In a few cases the omission of a stool causes a certain amount of inconvenience, but in the large majority an interruption of one, two, or three days may take place without any serious disturbances. The symptoms, when any are aroused by such an omission, consist in

slight heaviness about the sacrum, heat and fulness in the rectum or pelvis, and more or less hebetude. When the bowels move after the interruption, the mass may be perfectly normal or it may be hard and lumpy, requiring effort to pass it; the quantity expelled is ordinarily much larger than normal, and frequently the first stool is followed by two or three smaller ones before the sigmoid and rectum are emptied. The feeling of fullness and tenderness in the rectum and anus may remain for some time after the first movement, and an examination at this time will demonstrate a congestion of the hæmorrhoidal veins and an œdematous condition of the muco-cutaneous tissue around the anus. All of these symptoms may disappear spontaneously, or it may be necessary to flush the colon and have recourse to purgative medicines before they are relieved. Elevation of temperature and accelerated pulse-rate are frequently but not invariably present in acute constipation. There may be tenesmus or violent paroxysms of pain, and occasionally symptoms of obstruction, but these symptoms are rare except in cases with organic obstructions. Volvulus or intussusception may also produce them. In simple acute constipation they all subside, and the patient is relieved as soon as a good fæcal movement is obtained.

Habitual negligence of the calls of Nature and recurrent attacks of acute constipation result in a decrease of sensibility and atony or loss of expulsive power in the rectum which ends in the chronic form.

Treatment.—When the condition develops suddenly and has only lasted for a day or two in patients whose bowels have previously been regular, it is ordinarily wise not to interfere too actively at first. Especially is this true where mental absorption or changes in habits or environment account for the condition; such cases almost invariably right themselves. But when there are symptoms like headache, sleepiness, tympanites, pain in the back, in the inguinal regions, or about the anus, then it becomes necessary to move the bowels. If a simple enema does not relieve the symptoms at once, a rectal and sigmoidal examination should always be made to determine whether foreign bodies or mechanical obstructions are present. When it is simple constipation the enema should be repeated, and after all the hardened fæcal masses in the rectum and sigmoid flexure are removed, some mild laxative may be given in order to stimulate the peristaltic action of the small intestine and upper colon, and thus empty them. There is nothing better in these acute cases than minute doses of calomel, one-tenth to one-fourth of a grain, with bicarbonate of soda in triturate tablets; the one-tenth-grain tablets may be repeated every half hour, or the one-fourth-grain every hour until the bowels have been moved. Neither should be continued longer than eight hours.

Another remedy which has acted well in such cases has been sulphate of magnesia one ounce, and bicarbonate of soda one dram dissolved in four ounces of water; a tablespoonful of this is given every half hour until the bowels move.

Rochelle salts, citrate of magnesia, Seidlitz powders, phosphate of soda, and the various saline waters may also be used, but the above simple remedies will ordinarily effect just as good results as the most complicated aperients. Where there is tenesmus, tympanites, pain, and griping, hot applications to the abdominal wall often give great relief; and occasionally the constipation yields to a full dose of morphine administered hypodermically, thus indicating the spasmodic nature of the condition. When a low enema is given by an ordinary syringe and fails to produce a faecal movement, long rectal tubes (24 to 30 inches in length) may be introduced, with the patient's hips elevated and his shoulders lowered so as to allow large quantities of water to flow slowly into the colon. In this way as much as 4, 6, or even 10 pints of water may be introduced, and distressing symptoms are relieved either by the loosening up of an impacted faecal mass, or possibly by the undoing of a volvulus or intussusception. The syringe holding the water should be elevated not more than 2 feet above the patient's body, so that the fluid will run in very slowly. A little turpentine and milk of asafetida may be added to the injection, and they will materially aid in stimulating peristalsis. In one case of acute constipation it was possible to give immediate relief by the lifting up of a subinvolted uterus which had through a sudden jolt been carried downward and backward, and become impacted against the sacrum, thus occluding the rectum. With a Sims's uterine repositor the organ was lifted into position, not without some pain, however, and within a short time a full and free action of the bowels resulted. Another case of this kind was relieved by the evacuation of a large hæmatocele which developed in the pelvic cavity and thus practically occluded the rectum. Large abscesses, either of the ischio-rectal fossæ or the superior pelvi-rectal spaces, may occasion acute constipation, which salines and other laxatives aggravate rather than relieve. The evacuation of the abscess cavity results in immediate relief. Acute inflammation and spasm of the bowels may produce a temporary constipation, but ordinarily it is of very short duration, and soon resolves itself into a diarrhoea. Morphine relieves these cases. The slowly acting cathartics are not advisable in this variety of constipation.

CHRONIC CONSTIPATION.—Chronic constipation consists in inadequate or abnormally infrequent faecal passages, and prolonged retention of the faecal materials in the intestinal canal. It occurs at all ages, in every class, and is produced by a variety of causes, as has been shown.

Symptoms.—The typical symptoms in chronic constipation are gradually increasing periods between the faecal movements, associated with progressive hardening of the faecal mass, and decreasing desire to defecate. In the beginning there are ordinarily no constitutional symptoms; the patient simply notices that his stools are smaller, harder, drier, in lumps of various sizes, and generally of a dark-brown or greenish-black color. Later on he will observe, perhaps, that these masses are coated with mucus, which may or may not be tinged with blood. Frequently gelatinous masses of coagulated mucus will precede or follow the faecal mass, and sometimes one will observe in such passages particles of undigested food, like pieces of meat, fruit or vegetable material, and foreign substances.

When this condition has existed for a greater or less period, symptoms of indigestion appear; there are flatulence, lack of appetite, coated tongue, distention of the abdomen, and gaseous eructations. The tongue is usually pale, flabby, furred with white in the middle, and indented by the teeth at its edges; headache, drowsiness, and mental lethargy gradually come on; the patient's rest is broken by bad dreams, and he may gradually lose flesh and strength. Palpitation of the heart, dyspnoea, and occasionally vertigo and dizziness, accompany the condition. There may be disturbances of vision, tinnitus aurium, cardialgia (Melhose, Hufeland's J., 1841, Bd. xcii, S. 105), and various reflex symptoms, as follows:

Uro-genital Symptoms.—Constipation is frequently the cause of urinary disturbances through pressure of the faecal mass upon the ureters, the neck of the bladder, or the prostatic urethra; suppression of urine is said to have been occasioned by it (Barnwell, Cincinnati Med. News, 1875, p. 553). In chronic cases the urine is increased in quantity, the color is darker, and the solid constituents are increased; it is often loaded with urates, but oxaluria is one of the most constant features. Occasionally cases are seen in which there is an excessive secretion of urine with low specific gravity and clear limpid color. In these cases there is no evidence of glycosuria, and it is reasonable to suppose that the symptoms are purely reflex.

In young women constipation is frequently the cause of catamenial disturbances, hysteria, and chlorosis. That which is often described as chlorosis or anaemia is nothing more than auto-intoxication due to the prolonged retention of faecal material in the intestinal canal. Anteflexion and painful menstruation (Thomas), together with chronic inflammation of the uterus and its appendages, may all be caused by the protracted retention of faecal masses in the sigmoid and rectum.

Constitutional Effects.—Muscular rheumatism, stiffness of the joints, and lack of tone in the general system sometimes result from prolonged

retention of fæcal matter in the intestine. The hair and finger nails become dry and brittle, the skin is sallow, covered with silvery, scaly epithelium, or is often wrinkled and parchment-like. Sometimes there is acne, prurigo, urticaria, or furunculosis.

Alterations in bodily temperature are not so frequently associated with chronic as with acute constipation; there are persons who, upon the omission of one day's fæcal movement, will develop an elevation of bodily temperature of 3 or 4 degrees, and children, from no other apparent cause than accumulation of fæces in the intestinal canal, will have temperatures of 104° to 106° Fahr.

General practitioners have frequently observed the fact that in the course of continued fevers the temperature will be elevated when the bowels have not been moved for two or three days, and it is a constant experience in hospitals that the temperature of surgical cases will gradually rise after operative procedures until the bowels have been moved, when it will drop to normal, and remain so during the whole course of convalescence. Johnston (*Lancet*, London, 1879, vol. ii, p. 229) has recorded a case in which there was a temperature of 104.0°, pulse 180, and a delirium due to accumulated fæces in the intestinal tract. Barnes (*Med. Press and Circular*, 1879, p. 477), Cabot and Warren (*Boston Med. and Surg. Jour.*, 1880, p. 1571) have also reported cases in which there was great elevation of temperature due to fæcal accumulations. The explanation of these phenomena lies in some influence upon the heat center through auto-intoxication or irritation of the mucous membrane.

Nervous and Mental Symptoms.—In children, either acute or chronic constipation may result in severe nervous phenomena, such as St. Vitus's dance, epilepsy, and convulsions. In nervous and mental diseases of adults, chronic constipation is one of the most frequent complications. In hypochondria and melancholia it is almost always present, and may act as an exciting cause through the depressing effect of the accumulated fæcal material, the auto-intoxication from its putrefaction, and also through the overestimation upon the part of the individual of the necessity of daily fæcal movements. As has been said, this "daily movement" becomes the subject of unceasing thought and anxiety. Pulitzer (*Wien. med. Presse*, 1866, S. 439) and Dujardin-Beaumetz (*Bull. de therapeut.*, Paris, 1875, p. 179) have called attention to serious hallucinations and loss of consciousness in individuals suffering from constipation. Mattei (*Bull. de l'acad. de méd.*, vol. xxx, p. 870) has reported a case of aphasia due to constipation and fæcal accumulation. Every alienist has probably seen cases of temporary mental derangement associated with fæcal retention. The following interesting instance of this occurred in the author's practice:

Mr. A. T., lawyer, patient of Dr. Frederick Peterson, had been suffering from delusions, hallucinations, and partial unconsciousness for several weeks without any apparent cerebral disease to account for the same. His attack had begun in a diarrhoea with severe pains and tenesmus, which continued more or less persistently except when he was under the influence of opiates. This pain was at first referred to the lower portion of the abdomen and to the rectum. An examination with the pneumatic proctoscope established the presence of an impacted faecal mass in the sigmoid flexure, together with a small ulceration at the juncture of the rectum with the sigmoid. The faecal mass was loosened and removed by the use of solutions of ox-gall and oil, together with pneumatic distention of the bowel. Within a few days the patient's mental condition cleared up and he became perfectly rational.

Such conditions are doubtless due to an alteration of the blood resulting from the absorption of gases and putrefactive materials from the intestine. Vöstch, quoted by Johnston (*Pepper's System of Medicine*, vol. ii, p. 647), has reported 10 cases of suicide in which there were displacements of the colon and evidences of chronic constipation. He also quotes Laudenberger of Stuttgart, who observed that in 94 autopsies of insane individuals, one-seventh suffered from constipation and displacements of the transverse colon.

Treatment.—The treatment of any individual case of constipation will depend upon its cause. In children it is ordinarily due to malformation, unnatural diet, or some local disease of the rectum and anus, the pain of which causes them to avoid having movements. Malformations usually will manifest themselves in the first few days of infant life, and should be remedied in accordance with the methods before described (see chapter on Malformations).

Every accoucheur when he delivers a child should make it a practice to introduce his finger into the infant's anus, and determine whether the connection between it and the rectum has been perfectly established or not. It does the child no harm to dilate the sphincter slightly at this time; it stimulates the respirations, gives vent to the accumulated meconium, and also relieves the physician of any responsibility as to future accidents through the possible malformation of these parts.

In breast-fed children there will be less danger of constipation than in those brought up by the bottle. In these days of modified milk and artificial foods, it is presumed that the mother's milk is absolutely duplicated. There is a difference, however, between normal breast milk and chemically prepared reproductions of the same, which science has been unable to solve, and while many infants are raised to a strong and healthy childhood upon cow's milk and its modifications, it is very frequently found more than difficult to regulate their bowels and prevent constipation and diarrhoea under this regimen.

In many books on pædiatrics it is taught that the mother should place the child upon a vessel at a certain hour every day in order to establish the habit of fæcal movements at certain periods. The establishment of such a habit is devoutly to be desired, but this method of doing it is a most fruitful source of fissures, hæmorrhoids, and prolapsus of the rectum. If, in order to bring about a daily stool, it is necessary to stimulate the mucous membrane of the intestine, it is better to give the child a small enema of cold water at a certain hour every day. Ordinarily in bottle-fed infants the constipation is due to a lack of sugar in the food; this may be relieved by adding certain quantities of sugar of milk to it. Sometimes a lack of oil or richness in the milk will occasion it; in such cases an increase in the cream will frequently overcome the constipation and regulate the child's bowels. The addition of lime-water to milk for feeding children is very likely to result in constipation. The prolonged use of bismuth and such salts in the treatment of summer diarrhœa is also likely to develop it, and should always be followed by a laxative in order to clean these substances out of the intestinal canal after the diarrhœa is under control.

The use of castile-soap bougies or cones often stimulates a child's bowels to movement in cases with a tendency toward constipation, and if they are carefully introduced no harm is likely to follow; in fact, they are among the best remedies. After children have begun to eat solid food, the regulation of their diet is ordinarily all that is necessary to overcome the condition. The modern refinement of foods has a tendency toward the production of constipation in that it removes all the indigestible and rough portions, thus taking away one of the chief elements in the stimulation of peristaltic action in the bowels. Feeding upon white bread, prepared starch, predigested foods, arrow-root, and such substances as have no indigestible material is a most prolific cause of constipation in children from one to seven years of age. Oatmeal and cracked wheat in moderate quantities, together with a little sugar and milk, are most excellent foods for children, in that they furnish an adequate amount of roughness to stimulate the bowels to normal action. Fruits are useful, but they have too great a tendency to produce fermentation, and consequently diarrhœa. After the age of three to four years a diet containing a reasonable amount of waste, cold baths, massage to the abdomen, and outdoor exercise are the best methods of avoiding or treating constipation. There is nothing like a brisk run in the fresh air, with full, deep respirations and chest movements, to induce a normal action of the bowels. Cold baths are also very stimulating to peristaltic action; at the same time that the bath is given thorough rubbing and massage of the abdominal walls,

especially in the line of the colon, upward upon the right side, transversely, and then downward upon the left, will be found beneficial.

The habitual use of drugs in constipated children should be avoided. Occasional doses of calomel, rhubarb and soda, or glycerin and phosphate of soda act as useful bridges, but they should not be used too often. Castor-oil, while an excellent remedy in diarrhœa, cleaning out the bowel, and serving as a sedative to the mucous membrane, always leaves a tendency to constipation behind it in whatever form it is administered. Sulphate of magnesia acts just as well and does not leave this tendency. The stronger cathartics should not be administered to children.

Constipation in school-girls is a question of the utmost importance. The little attention given to the regularity of the bowels in girls in boarding-schools calls for the severest criticism. The rules and regulations of the recitation-room are important, but they are not paramount to the proper functional action of the patient's bowels. If teachers only realized that the call for a natural movement if resisted passes over and does not recur again under ordinary circumstances for considerable periods of time, and that any individual retaining fecal materials for longer periods than normal begins to absorb the toxic principles of those materials, and thus becomes heavy, sleepy, and lethargic, they would understand the importance of granting excuses from study or the recitation-room for such purposes at all times. No person can do good brain work with an intestine full of old, decomposing fecal matter. The large majority of cases of constipation in women have been generated in school-rooms, boarding-schools, or through mock modesty and the stringent regulations of polite society.

The proper location of the toilet-room is of more importance to a family or school than the elegance of their parlors. This should be so placed that neither weather, darkness, nor publicity should ever interfere with its use. The accommodations should also be adequate for all necessities. One water-closet is entirely inadequate for a family of five or six, and when one sees large boarding-houses or schools with only two little dark water-closets one wonders how the inmates remain as healthy as they do.

The tenements and public institutions of nearly all cities are criminally negligent in these matters. In one institution with which the author is connected he found upon beginning his service there one toilet-seat for seven hundred men. They stood in long lines to await their turn, many of them losing their desire before the opportunity for relief came, and others were forced through the urgency of their calls to use the buckets in their cells, thus fouling the atmosphere of the entire hall. This is an exceptional instance, but the same con-

dition prevails only in a less degree in many institutions outside of New York city. Its influence was exhibited in the large number of rectal cases which had to be treated in the hospital of the institution at that time.

In adult life the prevention and often the cure of constipation may be accomplished by a change of personal habits. Lethargic individuals leading sedentary lives should be urged to take exercise in the open air, and to avoid sitting too long in poorly ventilated rooms. Those who are given to eating largely and to stimulating their appetites with wines, condiments, and a rich dietary, should be advised to live more simply; a certain amount of fat with a meat diet should always be taken; in vegetables the fibrous, indigestible material has its uses, and should be eaten as well as the saccharine and starchy portions. The eradication of those fibrous portions of the food often results in such a decreased amount of refuse matter that an inadequate fæcal mass is formed; it is important that the food should contain a sufficient quantity of roughness to stimulate peristaltic action, and to furnish a proper amount of fæcal material for the intestine to act upon.

Alcoholic liquors, coffee in excess, and especially tea, should be avoided in these cases, inasmuch as they all cause congestion of the liver, with improper secretion of bile, and consequent constipation.

Attention to the functions of the skin is frequently of much benefit in constipation. Cold baths, with shower or needle-baths to the abdomen, followed by vigorous rubbing, is often productive of great good. The temperature of the water must vary, however, with individual cases. Cold baths are depressing to some, and in such cases tepid water should be used.

Stomachic indigestion is very frequently the precursor of constipation, and yet it is often the result of the same. At any rate the digestive functions should always be looked into very thoroughly, and properly regulated in every attempt to cure a case of constipation.

With these general remarks one comes to the management of the actual condition of deficient or retarded fæcal movements. Assuming that a patient's digestion is good, that he takes a sufficient quantity of proper food, and yet passes an inadequate amount of fæcal matter and at too widely separated periods, the question arises, What is to be done for him?

In the majority of cases the patients will have run the gamut of cathartic medicines before the physician is consulted. The popular and too often the professional treatment of constipation consists in the administration of some drug, usually without any reference to the cause. By referring to the section on Etiology one will see a very large array of conditions which may produce constipation; they are

functional and organic, chemical and mechanical. The food may be improper in quantity or quality; peristalsis of the intestine may be deficient through enervation, or it may be spasmodic; the secretions of the intestine may be deficient, so that the mass is too dry to be moved along the intestinal canal; the organs may be displaced; there may be strictures, mucous folds, neoplasms, concretions, foreign bodies, and a hundred other conditions either obstructing the fæcal passage and delaying it, or giving rise to catarrhal diseases, ulcerations, or other conditions of the bowel which limit functional activity, and thus prevent the movements.

The treatment of chronic constipation therefore consists in the treatment of the various conditions which cause it. By careful examination of the fæces one may learn whether the stomachic or intestinal digestion is incomplete. For the treatment of these digestive conditions the reader is referred to the works of Van Valzah and Nisbit, Ewald, Nothnagel, and Hemmeter.

Where there are evidences that the constipation is due to impairment of the intestinal, hepatic, or pancreatic secretions, drugs directed to the alteration of these conditions are advisable. Minute doses of calomel or protoiodide of mercury unquestionably stimulate the secretions of the glands. At the same time one may administer some of the modern aids to intestinal digestion, such as diastase, pancreatin, taka-diastase, peptenzyme, and lactopeptine.

Where there is evidence of fermentation and excessive flatulence, some antiferment, such as bismuth, boric acid, salol, naphthol, or betanaphthol, may be combined with the pancreatin.

If the stools are hard and dry, thus indicating an insufficiency of fluid, large drafts of water after and between meals should be advised. Occasionally this fluid may be administered before meals, especially if there is any evidence of excessive mucous secretion in the stomach. Two or three tumblers of hot water before meals will sometimes succeed in overcoming a chronic constipation, in which the most powerful laxatives of the pharmacopœia have failed. The fact that so many patients are benefited by visits to watering resorts, where the water itself has no particular medicinal value, is evidence enough that it is lack of fluids in the system and regulation of habits that account in a large measure for their constipation.

Where there is evidence of catarrhal conditions of the bowel and intestine throughout, these should be treated according to the methods laid down in the chapter upon that subject. Change of climate, regulation of diet, and outdoor exercise in moderation, are of the utmost benefit in such cases as these. Where such changes are not possible, exercise and regulation of the diet should be carried out at

home. If the stomachic digestion can not be made efficient, the food should be predigested or the nitrogenous elements in the diet should be reduced, and the patient put upon a carbohydrate diet. Where the condition, however, is one of intestinal indigestion, as is the case in the majority of instances, then the diet should consist largely of nitrogenous elements, such as animal soups, broths, fresh meats, eggs, fish, fowl, and oysters, with a sufficient quantity of green vegetables to produce an adequate fæcal mass which will stimulate the colon to peristaltic action. The fresh vegetables should consist of spinach, asparagus, kohlrabi, chicory, kale, onions, salsify, peas, cabbage, celery, string-beans, etc. The best bread in these cases is that made of gluten flour; but the crust of well-baked French bread, toasted bread, rye bread, or bread made of Indian meal, are admissible in moderate quantities. Potatoes, pastry, rich puddings, and confectionery should not be allowed. Along with this diet the administration of a sufficient quantity of glycerin to stimulate the intestinal glands to secretion, and thus increase the fluid element of the fæces, is often of great benefit. Small doses of phosphate of soda also serve this purpose.

W. Gill Wylie says that in the majority of gynæcological patients coming under his care, the constipation is due to a deficient amount of fluid in the intestinal canal, and that he obtains the best results by the administration of half an ounce each of castor-oil and glycerin before each meal, together with large drafts of water between meals; while one would expect this treatment to produce a diarrhœa, after the first few days it seems only to keep the stools soft and to continue comparatively normal actions. The one thing to be guarded against in the method is that it should not be stopped too suddenly.

In cases in which the constipation is due to displacement of the intestines or enteroptosis, the treatment is very difficult. The wearing of an abdominal bandage, such as has been advised by Van Valzah, will frequently accomplish a great deal of relief. Its use must be continued, however, for long periods, and the patient should be required to eat very small quantities of food at any one time, and thus avoid overloading the stomach and pressing it downward, for usually displacement of the colon is due primarily to the displacement of this organ. Displacement of the splenic flexure or of the descending colon rarely if ever produces constipation, but that of the transverse colon does. The question of opening the abdomen and suturing the transverse colon back into position is one that has frequently suggested itself, but the writer has never had an opportunity to put it into practice, nor is he aware of any one who has operated for this purpose.

The influence of an acutely flexed, displaced, or adherent sigmoid in the production of constipation has been fully discussed. As a natural

consequence, when this condition of affairs exists, the pelvic colon rarely empties itself completely, and the patients all suffer more or less from constipation, auto-intoxication, irritation of the gut, and frequent ulceration. Where the sigmoid flexure is normally movable and not constricted, the sigmoidoscope should pass through the rectum and into it without any great difficulty. In many cases of chronic constipation it has been found to be almost impossible to introduce the tube on account of acute flexures and adhesions; even after it has passed the constriction of the flexure it can only be carried a short distance upward, because the sigmoid can not be lifted up into the abdominal cavity and thus straightened out.

In these cases the constipation is accompanied with flatulency, heaviness in the limbs, and the patients are never completely relieved by a movement. Some benefit is obtained for them by the passage of a soft Wales bougie which is left in position for ten or fifteen minutes; the elastic curvature of the instrument lifts the gut up, stretches the adhesions, and partially straightens out the curvature. The same end may be accomplished by pneumatic dilatation of the sigmoid, a method that will be referred to later. These means often fail to give permanent relief. Under such circumstances the patient should be advised to have the adhesions broken up, and if necessary to have the pelvic colon sewed to the abdominal wall so as to prevent a recurrence of the condition. This operation, called colopexy, is described in the chapter on *Procidentia*. The author has performed it fifteen times, and while it has not always been done for simple constipation, upon inquiry he has learned that there has not been a single case in which the movement of the bowels was not free and comfortable after it. The patients in whom the operation was done for constipation alone have all been perfectly relieved. One may say that opening the abdominal cavity is not justified by the condition of constipation; but in these days of aseptic surgery one does not hesitate to do this operation for simple exploration, and it would seem to be justified as a means of searching for the cause of constipation or of relieving that cause when it has been discovered by other methods. In the case in which the sigmoid was held down by the appendix, the patient had not had a movement for years without pain and difficulty; she had become accustomed to the use of all sorts of laxatives and cathartics in large doses, and there was therefore a certain amount of atony and insensibility of the intestinal walls which required some stimulation in order to keep up the peristaltic action. Before the patient got out of bed after the operation she was having regular stools daily upon taking 3 drops of the fluid extract of cascara, and, at the present writing, sixteen months later, she takes no laxatives whatever.

Insufflation of air into the sigmoid flexure will frequently lift it out of the pelvis, especially if the patient be put in the knee-chest posture, and the distention of the gut will often result in a free fæcal movement shortly thereafter. Not only is this the case, but it frequently follows that the patient will have regular movements for two or three days after the inflation.

The author had in his practice a woman who came to his office twice a week on account of a most obstinate constipation; there was no dryness of the fæcal mass, and the quantity seemed to be comparatively normal, but the sigmoid flexure was always bent down in the pelvis until it was inflated by pneumatic pressure and thus lifted up. This treatment resulted in a movement shortly afterward, and often on the two or three following days. Two months' treatment in this way practically cured her. In these cases the air is not allowed to escape through the tube before the latter is withdrawn; in fact, it should remain and the sigmoid be distended so that when the patient rises it will stay outside of the pelvic cavity and allow the small intestines to fall down below it, thus keeping it above and in a somewhat straight line with the rectum, by which means the passage of fæcal matter into the latter organ is facilitated. By flooding the sigmoid flexure with liquids, such as saline solution, oil, oil and glycerin, boric-acid solutions, and simple hot water, it may be made to rise upward in the abdomen; such injections thus aid fæcal movements in a mechanical way as well as by local stimulation.

Where there is deficient peristaltic action of the intestines, massage is one of our chief remedies; no method is as satisfactory as that of rolling a heavy ball over the colon, beginning at the cæcum and carrying it upward and across in the line of the transverse colon, and downward to the sigmoid flexure. The patient should get a small cannon-ball weighing 3 or 4 pounds and cover it with chamois-skin, and use this as an instrument of massage; balls of this size, however, have become very scarce, and it is necessary to have them made to order. They can be purchased from Mr. Judd, of this city, or they can be made at home by pouring melted lead into a sand mold. An ordinary baseball will do, except that it is not heavy enough to give the pressure necessary upon the colon.

Electricity may be used in these cases; the positive electrode (Fig. 182) is introduced into the rectum, and the negative is applied along the tract of the colon and sigmoid over the abdomen. No doubt some cases have materially improved while the electric treatment was being carried



FIG. 182.—
RECTAL
ELECTRODE.

out, but it has been a question as to whether it was the massage produced by the rubbing, the irritation to the mucous membrane, or the electricity itself which benefited the patient. Recently much has been said concerning vibratory treatment of constipation. The author applies it to the abdomen, especially over the line of the colon and over the lumbar spine through a rolling vibratode, and to the rectum and sigmoid through one made of rubber fourteen inches in length. From his limited experience it appears to be useful in atonic cases.

In such cases strychnine, arsenic, phosphorus, phosphide of zinc, and all the nerve tonics and stimulants which are at our command should be made use of in turn. The massage, however, with the heavy, covered ball has proved beneficial in more cases than any of these remedies. In patients whose conditions do not permit of their taking proper exercise, massage or mechanical movements have frequently proved of great benefit; in old, stout, lethargic individuals they are exceedingly useful. They are not "cure-alls," however, as some of their advocates claim, and must be used in connection with proper local and general treatment.

Ulceration and inflammation of the sigmoid and colon are spoken of as causes of constipation, though it is likely that they much more frequently produce diarrhœa. When the ulceration can be seen through the sigmoidoscope, it should be treated locally by such remedies as have been advised in the chapter upon that subject.

Thus far we have considered the treatment of constipation when caused by conditions in the intestinal tract above the rectum proper. Within this organ various conditions may cause it, such as fissure, stricture, foreign bodies, fistula, neoplasms, etc. It is not necessary to reiterate the principles of diagnosis and treatment of these disorders in this place. There are a few conditions, however, which demand special mention.

Spasm of the Sphincter.—Mathews (Diseases of the Rectum, p. 55) holds that the large majority of the cases of constipation are due to hypertrophy and spasm of the external sphincter. Admitting that this may offer an obstruction to fæcal passages, one must give some account of the cause of such hypertrophy and spasm. The sphincter muscle is not continuously in a state of spasm, such as can not be overcome by the inhibitory power, unless there is some inflammation or irritation present. Whenever this has been relieved, notwithstanding it may leave the sphincter in a hypertrophied condition, the constant spasm ceases. The nerves, however, may be left in such a sensitive state that the pressure of the fæcal mass will occasion spasmodic action of the muscle and thus prevent fæcal passages.

The true cause of constipation then is not in the muscle itself

but in the inflammation or the sensitive nerve condition. The fact that the stretching of the sphincter often relieves constipation is proof enough that it is not due to the spasm, for we know that a sphincter, however thoroughly it is stretched, if it is not ruptured, will resume its tone and spasmodic contraction within a few days; stretching it can not possibly reduce the hypertrophy, inasmuch as it is only put at rest for a short time and a hyperæmia is induced, thus giving a greater blood supply and all the elements for increase instead of atrophy. At the same time it often does cure obscure fissures and minor anal ulcerations through the temporary rest which it gives to the parts, and along with these the constipation disappears. They are the causes of the constipation and not the spasm of the sphincter. There are cases in which there is abnormal contraction and fibrous degeneration of the external sphincter muscle occasioning constipation, but when such is the case the condition is practically one of stricture.

In all cases of constipation with this contracted type of sphincter, either gradual or forcible dilatation of the muscle should be practised; at the same time one should not be too positive in his prognosis as to the result upon the constipation. Where a fissure can be clearly seen, and there is no other reason for the constipation, incision is preferable to stretching, the relief is more permanent and far more certain, and the operation can be done under cocaine without general anæsthesia.

Hæmorrhoids.—As a rule, hæmorrhoids are the result of constipation rather than its cause, and operations upon them for the relief of this condition are very likely to result in disappointment. A large mass of inflamed or hypertrophied hæmorrhoids may obstruct the passage of hard fæcal masses and thus intensify the constipation, but they are rarely the exciting cause. In cases where such exist in connection with constipation due to local conditions higher up in the bowel, it is advisable to operate upon the hæmorrhoids before undertaking the treatment of the other condition; or at least if the latter requires operative interference, it should be done at the same time. But little can be promised a patient so far as the cure of constipation is concerned by the operative treatment of hæmorrhoids alone.

Houston's Valves.—Many cases of constipation have recently been reported as cured by incision of the valves of Houston. Martin, of Cleveland, first introduced this operation under the name of *Valvotomy*. His method is as follows: The patient is placed in the knee-chest posture and a tubular speculum of 30 millimeters diameter is introduced up to the projecting valve. The resistance of the valve is tested by the use of the hook (Fig. 183) bent at an acute angle. If the hook holds in

the valve when dragged down upon, the latter is said to be abnormal and to require section.

The patient is prepared for operation by having the bowels thoroughly cleansed and washed with antiseptic solutions. The valve to be divided is first fastened by the volsella forceps or long tenaculum; the hook of the tenaculum is made to transfix the mucous membrane and fibrous portion of the valve only (Fig. 183). The depth to which the valve should be cut is determined by the point at which a uterine sound curved to three-quarters of a circle is arrested when introduced above the valve and pulled downward. When this is done the point at which the probe rests will be shown by a blanched eminence, and the distance

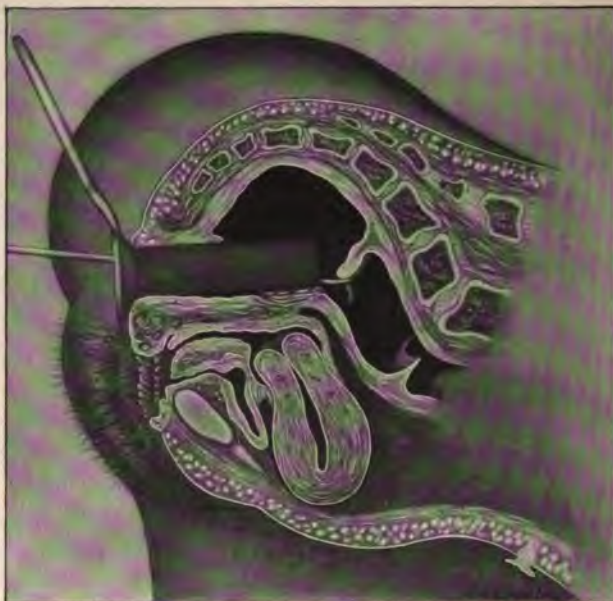


FIG. 183.—TESTING RESISTANCE OF VALVE WITH MARTIN HOOK (Hemimeter).

between this and the free border of the valve should be either measured, or the valve should be transfixied by a curved bistoury while the probe is in position, somewhat nearer the free edge than the point at which the probe presses. After having determined the point at which the incision is to be made, the valve is fastened by two tenacula upon either side of this point (Fig. 184). The knife (Fig. 185) used is a special device of Dr. Martin. The transfixion ought to be made when the valve is at right angles to the intestinal wall, and not when it is drawn down. In order to avoid pulling the valve downward in this procedure, Martin advises the use of proctoscopes of different lengths, so that they will just reach the valve. Having made a

first incision, which is very shallow, with the sharp-curved bistoury, he then takes a scalpel (fastened upon a similar handle to that of the bistoury) and carries his incision deeper. In his first paper he stated that if hæmorrhage occurred, he was in the habit of controlling it by the application of temporary clamps. Later on, however, he modified this by using sutures which bring the cut edges of the mucous membrane together. He has devised some ingenious instruments for introducing them, but even with these the operation seems quite difficult. It is questionable whether the suturing does any good, as primary union is not likely to take place, and Martin says that he has never seen a hæmorrhage sufficient to cause him any great uneasiness.

The after-treatment he describes as follows: "Every day the wound is inspected and dressed according

to the nature of its requirements, and after the first two or three days the valve should be carefully subjected to divulsion or massage by the means of a coactor. Should there ensue a rectitis or a granulating wound, it may be treated by the means of an atomizer, by the use of topic applications otherwise administered, or by lavage."

Pennington, after having had 1 case of peritonitis and another in which there was a severe hæmorrhage following the operation as above



FIG. 184.—FIXATION AND INCISION OF VALVE AFTER MARTIN'S METHOD (Hemmeter).

described, devised the ingenious clip (Fig. 186) which severs or cuts out an elliptical piece from the free border of the rectal valve. This clip is applied while the valve is in its normal position (Fig. 187), and by its gradual pressure causes a necrosis of the tissues, thus cutting through

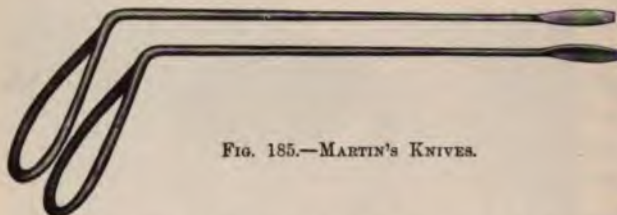


FIG. 185.—MARTIN'S KNIVES.

the folds without any danger of hæmorrhage, and if the peritonæum should by any possibility be involved in the valve, it

causes adhesions between the two layers and thus prevents perforation and subsequent peritonitis. Gant has devised a modification of this clip (Fig. 188) which does not require a special instrument for introducing it, but it is larger and more likely to irritate the rectum. This is a safer and simpler method of operating than that originally devised by Martin, and appears to accomplish exactly the same end (Figs. 189, 190).

Martin states that he has operated upon more than a hundred cases by this method, and has absolutely cured the constipation in almost every one. Pennington relates a similar experience, as do also Cook, of Nashville, and Beach, of Pittsburg. Earle, of Baltimore, Gant, of New York, and the author have employed their methods in numerous cases, but have seen permanent improvement in very few cases. Earle states that recently he has seen 2 cases in which the operation seems to have effected a cure. The author has seen some cases in which there were inflammatory and connective-tissue changes in these folds, thus constituting crescentic stricture of the rectum; these were incised with much benefit to the patients, but they suffered more from diarrhœa than constipation. In some cases in which he oper-

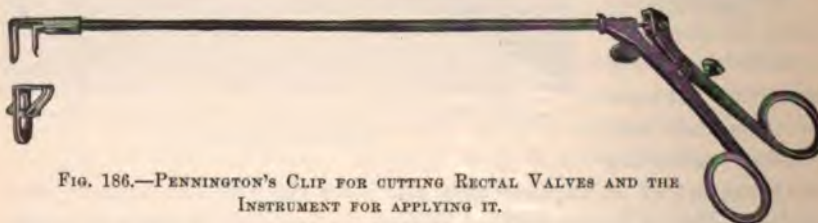


FIG. 186.—PENNINGTON'S CLIP FOR CUTTING RECTAL VALVES AND THE INSTRUMENT FOR APPLYING IT.

ated upon the valves there was an immediate increase of frequency in the fæcal movements; in fact, they became too frequent, and the patient suffered from more or less tormina and griping. As the operative wound healed, however, these conditions disappeared and the old-time constipation returned. In 1 case in which he operated by the Pen-

nington clip, the movements were accelerated from the very day that the clip was put on. In fact during the whole period that the clip was cutting through the valve the patient had from one to three movements each day. Now it must be observed that these movements occurred before the clip had cut through and while the valve was still

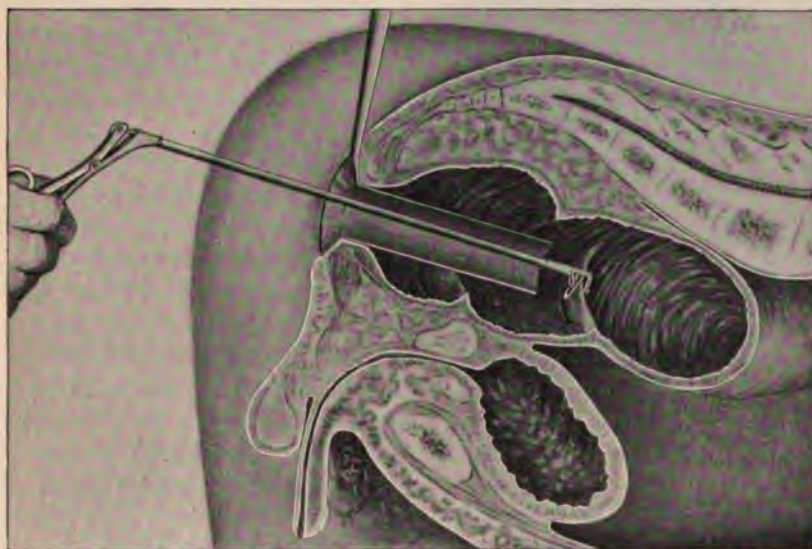


FIG. 187.—PENNINGTON'S CLIP APPLIED.

intact. The obstruction to the fæcal passages could not therefore have been relieved, and we must look to some other influence to account for their increase. This influence consists in the irritation of the intestine produced by the incision in Martin's method and by the pressure of the clip in Pennington's. This stimulation continues to act until the ulcer is healed, and therefore no conclusions can be drawn from this period.

If, as is advised by Martin, the patient's diet and habits be regulated, if his environments and methods of life be changed so as to be most conducive to the regular action of the bowels, this increased activity may be maintained, and the patient by establishing systematic habits with regard to stool during this healing period will be relieved of his constipation. But these methods will often relieve it without cutting the valves. The passage of bougies, rectal tubes, and instruments for the treatment and examination of the operative field, the introduction of ointments, sprays, and antiseptic washings, are all conducive



FIG. 188.—GANT'S CLIP FOR CUTTING RECTAL VALVES.

to the production of peristalsis and movements of the bowels. The author therefore believes that the benefits which have followed valvotomy are due in many cases more to the after-treatment than to the mere section of the valves.

The permanency of the results, however, depends largely upon the maintenance of the habits which are established during this period.

Medicinal Treatment.—It is quite the habit among authors to devote long paragraphs to condemning the use of laxative medicines in constipation, and immediately follow them with favorite formulas for pills, powders, and mineral waters. The fact remains that whatever treatment is adopted it is

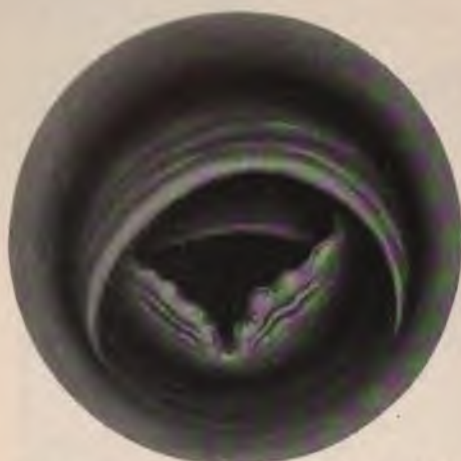


FIG. 189.—RECTAL VALVE AFTER INCISION BY MARTIN'S METHOD (Hemimeter).

necessary occasionally to have recourse to these remedies. The danger consists in relying upon them entirely and failing to treat the real cause of constipation. A wise selection of these useful remedies marks the true clinician. One should study the condition of patients and determine those forms of laxatives which seem indicated by the character of the stool and the general symptoms. Where the stools are too dry and hard, together with free administration of water, one may give some saline, such as sulphate of magnesia, sulphate of soda, cream of tartar, or phosphate of soda. Common salt sometimes acts very well. These remedies may be given in one full dose before meals, or in small broken doses during the day, in order to stimulate the secretion of the intestinal glands. They may also be administered in the form of laxative waters, such as Rubinat, Apenta, Hunyadi, Congress, Hathorn, or Friedrichshall. Glycerin is an excellent remedy in this type of constipation, and may be given in doses of from 1 to 4 drams three times a day. When there is simple atony without much mucus in the intestinal canal, cascara sagrada is one of the best laxatives; in fact, it is the most generally applicable of all of



FIG. 190.—RECTAL VALVE AFTER OPERATION BY PENNINGTON'S CLIP.

them. There are many preparations of this drug upon the market, but only three of them need be given any serious consideration. The confections and aromatic extracts are utterly unreliable. The powder, fluid extract, and cascara may be relied upon. The fluid extract is best given either pure or in malt preparations: maltine and maltzyme, with cascara, 2 to 6 drams, at bedtime, or from 1 to 2 drams after each meal. The fluid extract is best administered by dropping from 10 to 40 minims in a half tumbler of water and allowing this to stand for about fifteen minutes; when the resinous constituents of the extract settle to the bottom of the glass, the clear part of the solution should be decanted off; this contains all the laxative elements of the drug, and is generally efficient in its action. The powder is given in doses of 3 to 6 grains. The administration of strychnine, nux vomica, and other nerve tonics is quite important along with cascara in these cases. Confection of black pepper is a favorite remedy with some of the English surgeons, especially Dr. Cripps. It is very difficult to get it properly made in this country, and therefore it is little used. Franck's "grains de santé" are often very useful in simple atonic constipation. Where there is sallowness of the skin and jaundiced conjunctiva indicating congestion of the liver, the following trituration tablets may be given:

℞ Calomel gr. $\frac{1}{4}$;
 Podophyllin gr. $\frac{1}{12}$;
 Bicarbonate of soda gr. 1.

Ft. tab. No. 1.

Sig.: Take after each meal.

One of the best combinations for a temporary laxative effect is that known as Cathcart's pill. It consists of

℞ Ex. colocynth comp. gr. jss.;
 Aloin gr. $\frac{1}{8}$;
 Ex. belladonna, }
 Ex. nuxis vomica, } āā gr. $\frac{1}{4}$.

Mi. et fiat pil. No. 1.

One or two may be given at bedtime.

Citrate of magnesia, licorice powder, phosphate of soda, and the various proprietary laxatives are all more useful for cleansing out the bowel and treating diarrhœa than they are for constipation.

In old people, with hearty appetites, the old-fashioned Lady Webster pill given after the evening meal will frequently give more satisfaction than any other remedy.

Where there is congestion of the rectum or pelvic organs, cold-

water enemata should be used instead of laxatives for moving the bowels. The use of glycerin suppositories for this purpose is very popular, but they will produce rectitis if continued for a long time. The above remedies alternated one with the other are useful adjuvants to the local and constitutional treatment of constipation, but they are simply adjuvants or helps, and should never be relied upon exclusively. Useful as all such remedies are, they should be employed only for temporary relief while the actual cause of the constipation is being removed.

Fæcal Impaction.—This consists in an arrest of the fæcal mass at some portion of the intestinal canal; it usually takes place at the cæcum, the sigmoid flexure, or in the ampulla of the rectum. It may also occur in sacculi or diverticuli of the intestine.

The causes are similar to those of constipation. Catarrhal diseases and dilatation of the colon very frequently produce it, as do foreign bodies in the intestinal canal, such as fruit-pits, grape-seeds, enteroliths, and cestodes. The fæcal mass is hard, sticky, and ordinarily contains excessive lime salts; it is made up of small, round lumps compressed together by the muscular action of the bowels. In those cases in which the impaction takes place at the cæcum, it is often assumed that the mass is arrested above the cæcal valve in the small intestine, but this is not frequently the case.

Symptoms.—The symptoms of impaction are ordinarily constipation or the sudden cessation of fæcal movements, followed in a short time by griping, heaviness or weight in the region of the impaction, and a tendency to diarrhœa, with frequent teasing, liquid stools, sometimes containing small quantities of mucus and blood; with these, symptoms of auto-intoxication occur in the form of furred tongue, bad breath, torpor, and mental derangements, such as hallucination, delusions, and even mania; indigestion, flatulence, and fæcal vomiting may be caused by this condition, although the last symptom is quite rare. The diarrhœa is produced by the irritation of the intestine by the arrested mass.

Reference has been made to 2 cases of mental derangement due to retention of fæcal material in the intestine; and a case of epileptoid convulsions has been seen by the author, apparently due to the arrest of a mass of plum-stones in a child's sigmoid flexure. Nervous derangements following constipation, rapidly succeeded by a diarrhœa, are always indicative of fæcal impaction. In children one always suspects cestodes; thus in a child eight years of age a mass of lumbricoid worms as large as the fist entirely obstructed the rectum except for the passage of small amounts of fluid fæces around it. A frequent inclination to go to stool with the passage of only wind or very small

quantities of fluid matter, aching in the left side, back, or pelvis, and shooting down the left leg, constant spasm or pain about the anus, and frequent or difficult urination, may all be occasioned by impacted fæces. Where the impaction is in the sigmoid flexure or rectum the diagnosis is comparatively easy, either by the aid of the finger or by the sigmoidoscope, but when it is in the upper portions of the colon this is sometimes very difficult, as it simulates volvulus, intussusception, and intestinal neoplasms.

The length of time an impaction may exist is indefinite; in 1 case it lasted from the end of May until the middle of September. In another case in which the author was consulted in August, 1899, with regard to the nature of a tumor about the size of a baseball in the right iliac fossa, and supposed at the time to be a tumor of the cæcum, the woman stated that the lump had been there for over a year and had caused her little inconvenience; her physician testified to the fact that it had not apparently grown in three months; she suffered at the time from tenesmus and frequent small fluid passages which brought no relief. Under the use of large colon flushings, with full doses of sweet-oil and glycerin, on the fourth day the mass moved into the transverse colon, and finally passed through the sigmoid and into the rectal ampulla, where it was arrested. It was necessary to dilate the sphincters to remove it. It was composed of faecal and calcareous material, indurated, but smooth on its surface, and weighed 1 pound and 3 ounces.

The diagnosis has been already discussed. In persons with thin abdominal walls the doughy feeling of the mass sometimes may be made out. Gersuny claims to be able to distinguish it from neoplasms by the adherence of the mucous membrane to the mass, but this seems incredible. The acuteness of the attack combined with the general symptoms above detailed are more reliable guides.

Treatment.—The treatment of impaction consists in removing the impacted mass. Where it is low down in the rectum and its passage is obstructed by spasm of the sphincter, it may sometimes be necessary to stretch this muscle and break up the mass by a scoop (Fig. 191) or by Currier's forceps. The use of such instruments in the rectum ordinarily results in more or less traumatism to the anus, and occasions the patient considerable suffering afterward. It is better before resorting to them to administer an enema of a half pint of



FIG. 191.—KELSEY'S RECTAL SCOOP.

warm water containing 2 drams of inspissated ox-gall or 2 ounces of hydrogen peroxide; this should be retained as long as possible and repeated four times within twenty-four hours; at the end of this time it will usually be found that ordinary faecal impactions of the rectum will have softened down so that the patient can pass them without assistance. Where the impaction is in the sigmoid flexure this same method should be employed, except that the injection should be given through a long Wales bougie and with the patient in the knee-chest posture.

Drastic cathartics should never be given in impaction. While these drugs increase the amount of fluid in the intestine and thus tend in a certain way to soften the mass, the peristaltic action and spasm which they produce are likely to result in traumatism of the walls of the gut from pressure against the mass, and may sometimes occasion rupture where the intestine is already thinned and inflamed. They may also result in forcing a hard faecal mass into a narrowed or strictured caliber of the gut, thus bringing on complete occlusion and all the symptoms and consequences of obstruction.

After trying the injections for twenty-four hours, if the mass is not softened and does not move, it is then wise to attempt its removal by mechanical measures. When the impaction is in the rectum, it is best to give the patient gas or chloroform and dilate the sphincters. In many cases the mass will be passed spontaneously as soon as the patient goes under the influence of the anæsthetic. Where the patient is unwilling to take an anæsthetic it is best to introduce a bivalve speculum into the rectum and through this try to break down the mass by the use of forceps and scoop. The handle of an ordinary tablespoon, a dull uterine curette, and bullet forceps may take the place of Currier's forceps and the rectal scoop. In women the mass may be forced out through the anus or held by two fingers introduced into the vagina while it is being broken up.

When the impaction occurs in the sigmoid flexure it is almost impossible to reach it with instruments. Here one must depend very largely upon the use of enemas and massage. Impactions may be dislodged by the use of the pneumatic proctoscope; twenty-four hours after having injected glycerin and ox-gall the instrument is introduced and the sigmoid flexure distended by air, thus lifting it up into the pelvic cavity and dislodging the mass. This procedure has succeeded in 3 obstinate cases, in one of which it was necessary to dilate the sphincter before the hard mass could pass. Where such procedures fail one would be justified in anæsthetizing the patient and introducing his hand through the rectum and into the sigmoid flexure in order to break up the mass and remove it; this should not be done, however, by any one whose hand measures more than $7\frac{3}{4}$ inches in circumference.

In all cases before dilating the sphincter or attempting to remove the fæcal mass by the introduction of the hand, a large injection of warm sweet-oil should be given to lubricate the parts, and thus make the mass move smoothly through the gut. Where the impaction occurs above a stricture too much manipulation from below should be avoided, as the gut may be very easily ruptured under such conditions. One should not hesitate under these circumstances to perform an inguinal colotomy, and in this way relieve the patient. If the stricture is a benign one it may be treated afterward by dilatation or resection as the surgeon may think best; but neither of these procedures should be undertaken with a mass of impacted fæces arrested above the stricture.

In all cases in which impaction has existed for any length of time there will result a certain amount of inflammation of the mucous membrane which should be carefully treated after the removal of the impaction. Immediately following the removal, the colon should be flushed with a large quantity of hot saline solution in order to wash it out and also to stimulate the patient, as great exhaustion frequently follows the removal of these masses. On the day following the bowels should be moved by a saline laxative, after which they should be thoroughly irrigated with normal salt solution or some astringent, such as fluid extract of *krameria*, *hydrastis*, or *pinus canadensis*. Mathews advises the use of tincture of iron or tannin in solutions with glycerin in such cases. The objection to glycerin is that it ordinarily produces such a prompt movement of the bowels that the tannin does not have the astringent effect which is desired. Strychnine and belladonna should be administered to promote peristaltic action and overcome the atony which the distention produces. As soon as the inflamed condition of the parts permits, the patient should be required to take regular exercise, such as horseback-riding, golf-playing, walking, etc., and his diet should be carefully arranged in order to prevent the recurrence of impaction. It is not necessary to repeat the precautions heretofore expressed with regard to the regular movements of the bowels in patients who have once suffered from impaction.

CHAPTER XV

PRURITUS ANI

PRURITUS ANI is a symptom and not a disease. It is associated with or caused by almost every known disease of the rectum and anus; it is also produced in a reflex manner by affections of the uro-genital organs and by certain constitutional conditions, such as gout, rheumatism, and lithæmia. If, however, we consider it simply as a symptom or complication of other affections, then logically it should be treated of under those diseases, and the present chapter would not be written. This, however, would cause confusion, for many still believe in a *pruritus ani essentialis*—a disease without a pathology, an effect without a cause.

There is, according to dermatologists, a variety of pruritus unassociated with any pathological changes in the parts where the itching is felt, and which is due to some central neurosis. This condition is usually distributed over a large area of the body, although it may be limited to some distinct spot. It is often associated with neurasthenia, hysteria, and melancholia. The mind seems to have a distinct influence upon such cases, and they are frequently subjects of delusions, in that they believe they find pediculi or irritating substances upon their bodies. Bronson describes this condition very well, enumerating three forms of essential pruritus: pruritus senilis, prurigo (of Hebra), and pruritus hiemalis. These forms of pruritus, however, do not affect the anus. They attack the extremities or the body itself, especially the thorax and abdomen. In classifying pruritus ani, he says: "It is often due to irritations originating from the rectum or regions high up, or possibly from a strictured urethra, but it is much more apt to be associated with those general conditions mentioned above. The appearance of the anus in this affection is characteristic. It has a whitish, sodden look that is usually accompanied with a foul-smelling secretion. The folds are swollen and the furrows deepened. Often the effect of scratching is to complicate it with eczema. It is one of the most distressing forms of the disease." This statement is in keeping with that of a large number

of dermatologists, surgeons, and writers upon rectal diseases. It will be observed, however, that he describes pathological changes in the appearance, structures, and secretions of the anus. Thus tacitly he proves that there is an etiological agent for the itching in these conditions. The very changes which he describes here as existing in cases of pruritus essentialis are the products of established diseases of the rectum and anus.*

Allingham (*loc. cit.*, p. 249) insists upon pruritus always being due to some pathological or functional cause. He does not limit it to some simple local changes, conditions, or diseases about the margin of the anus, but attributes it to constitutional and general conditions. It is this latter class, in which no local affection or alteration of the parts is observable, that has led the dermatologists and writers on this subject to elaborate this doctrine of essential pruritus ani. Mathews takes the stand that it is always a disease of local origin, and he explains the fact that we fail sometimes to find alterations or accidents sufficient to account for the symptoms upon the basis of reflex action, arguing that the inferior hæmorrhoidal nerves are distributed to the lower inch (or more) of the mucous membrane of the rectum, as well as to the external surfaces around the anus; and that whatever irritates these nerve-ends will also produce irritation and itching about the anus. This asserts that those cases of pruritus in which no external cause of the symptom can be found are due to some cause inside of the sphincter and involving the lower inch of the rectum.

All of this is true, but there are still found cases in which no disease can be located either in the anus or in the lower inch of the rectum. Shall these instances be called pruritus ani essentialis? By no means, because, as will be seen later on, there are several conditions, both constitutional and local, which produce pruritus and yet cause no pathological changes in the lower portion of the rectum or anus. There is no such thing as pruritus ani essentialis, strictly understood; but, on the contrary, every case of pruritus, however mild or severe, will find a cause in some local or general functional or pathological change.

Pruritus ani is a condition characterized by many eccentricities. To the student of rectal diseases it is simply a symptom referable to sundry pathological conditions, but to the patient it means an agony beside which pain would be a pleasure. Its marked feature is itching about the anus, but this itching is different from that felt in any other part of the body: it comes when at repose, it is not relieved by scratching, and is out of all proportion to the changes in the parts. It is also peculiar in that hyperæsthetic, hysterical individuals rarely suffer from it, and if they do they suffer less than phlegmatic, strong individuals. Cases of dysæsthesia or hyposelaphesia, whose sensibility

to pain is below normal, are the greatest sufferers from pruritus ani. It is also peculiar in that time does not palliate it. The longer it lasts the worse it gets.

Characteristics.—The characteristic feature of this affection can be described in one word—*itching*: remittent at times, but when it has once begun, incessant, tormenting, tantalizing, distracting. Almost every adjective in the English language expressive of irritation, discomfort, and pain has been applied to this sensation. As to when or how it begins, few patients can give any satisfactory account. They all know that for a long time they have felt a sensation of uneasiness, or rather a slight inclination to scratch about the anus; but they can only fix the time when this sensation changed from that of semi-pleasure to the maddening, unrelievable affliction which is termed pruritus ani. In some the itching appears only at night after the patient has retired and becomes thoroughly warm in bed; in some it occurs whenever they experience a sudden change from cold to heat; in some the attacks are not influenced by cold or heat, by night or day, but they are brought on by mental strain, overwork, and anxiety;

in some a change of diet, or a special article of food will excite the most violent attacks; in others removal from one climate to another, such as from the seashore to the mountains, or inland to the seashore, will induce the affection. Under whatever circumstances or from whatever causes the condition arises, it is never described as anything else but an itching—intolerable, painful, and mind-racking.

After the condition has existed for some time, nervous and physical phenomena begin to appear as a result of the irritation and exhaustion due to loss of rest and sleep. Fre-

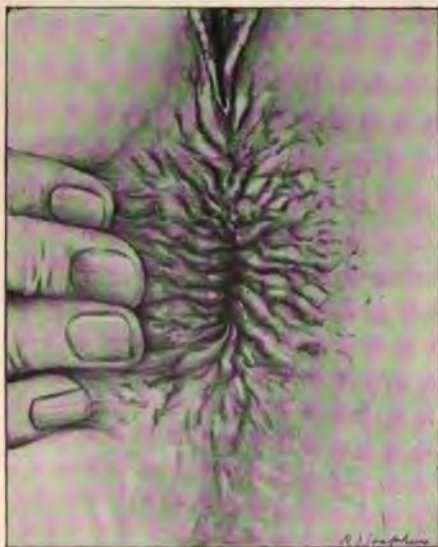


FIG. 192.—PRURITUS ANI.

quently the cart is put before the horse, and these conditions are diagnosed as the predominant element in the case, and assigned as the cause of pruritus instead of *vice versa*. Pruritus ani is not a frequent symptom of nervous exhaustion, but nervous exhaustion is a frequent result of pruritus ani. Small scratches, denuded spots about the margin

of the anus, thickened and œdematous folds (Fig. 192), the disappearance of the normal pavement epithelium about the margin of the anus, a white and sodden appearance of the epidermis of this region associated with a moist and foul-smelling secretion; or, on the other hand, a dry and brittle condition of the mucous membrane, which cracks when it is pulled apart or distended by large fœcal masses, all of these conditions have been described as symptoms of pruritus. They do exist with the pruritus, but like it they are the symptoms and results of the same pathological conditions.

Etiology.—The sources to which pruritus has been attributed are without number. Almost every affliction to which the human flesh is heir has been assigned as a cause of pruritus. Many of these are without any foundation in fact, but have been lighted upon by searchers for something to account for the itching with which their patients suffered. The causes are external, internal, constitutional, and reflex.

External Causes.—By these one understands those affections or diseases which are located upon and affect entirely the external anal surfaces. Under this class may be enumerated pediculi, parasites, eczema, dermatitis, herpes, and erythema. The forms of pediculi which may affect the anus are the pediculi pubis and corporis; in fact, neither of these very frequently locates itself about the anus. The spores are not often found in this region, and the itching of the anus which is associated with their presence upon the body is generally reflex. Nevertheless where they have been found upon the body and an itching about the anus is complained of, one should carefully search the parts for their presence, and whether they are found or not, use those remedies which are known to destroy their spores, such as blue ointment, fluid extract of larkspur, and solutions of mercuric chloride.

Of the visible parasites which cause itching about the anus, the trichophyton is about the only one of any importance. This parasite, which is the cause of eczema marginatum, is not infrequently found upon the nates and about the anus. The fungus was discovered by Bazin in 1854, and it is said to be identical with the parasite found in tinea tonsurans and tinea sycosis. It is found in the superficial layers of the epidermis, is said to be highly contagious, and may be transmitted from animals to men. Some patients are very susceptible to this disease, and when pruritus exists in men who have the care of horses or cows, it is always well to take this condition into consideration. The diagnosis is described in books on dermatology, but it may be said that a microscopic examination will always disclose it if present; a small scraping of the epidermis obtained from one of the little hyperæmic areas should be placed upon a slide, treated with diluted liquor potassæ, and then covered with a glass cover and subjected to

some pressure. The characteristic appearance of the fungus is that it contains very numerous spores or rather mycelia. The spores exceed the mycelia, and they are more numerous in the corneous layer and around the bulbous roots of the hair. Failure to discover the mycelia should not, however, be taken as a positive proof of their absence; repeated negative examinations are necessary to be conclusive. When they have been discovered the disease should be treated in the same manner as elsewhere in the body. Sulphur in the form of an ointment, or sodium hyposulphite (1 dram to the ounce), either as a lotion or in the form of an ointment, will generally prove efficacious. Sulphuric acid and chrysarobin ointment are also very effectual in inveterate cases. Salicylic acid combined with ichthyol is also satisfactory.

True eczema of the erythematous form sometimes occurs about the anus. One is very likely to mistake it for the erythema produced by the local irritations of vaginal discharges, and harsh or irritating detergent materials. This form of eczema is characterized by more or less extensive red and whitish patches; there are no fissures, papules, or pustules, but there may be some excoriated points and raw spots due to scratching; it is an exceedingly rare affection of the anus, and there is really no means to make a positive diagnosis between it and some other forms of true erythema due to such irritations as have been mentioned above.

Herpes is another local affection which sometimes occurs about the margin of the anus, and is said to produce pruritus, but it more frequently produces actual pain than itching. When it exists, it is perfectly evident to the naked eye, and there is no difficulty in its diagnosis. Its treatment has been already described. It should be remembered, however, that where herpes occurs upon the muco-cutaneous margins there is always reason to suspect malarial complications.

Local Causes.—Itching may be associated with or a symptom of fissure, piles, fistula, ulceration, diseases of the crypts, foreign bodies, constipation, catarrhal diseases, cestodes, neoplasms of the rectum, gonorrhœa, and syphilis; but that aggravated cases of true pruritus are ever due entirely to these causes is very doubtful. Fissures and fistulas may be cured, hæmorrhoids removed, ulcerations healed by local applications, and yet the itching for which these operations were done persists sometimes in a more aggravated form, so that one loses faith in these conditions as causes of the symptom. It is only necessary to say here that wherever these diseases exist in patients who suffer from pruritus ani, they should be removed by operation or whatever treatment is necessary; but at the same time one should be exceedingly guarded in promises to the patient with regard to the effect of such proceeding upon the pruritus, as it may or may not be benefited.

Diseases of the crypts of Morgagni are frequently the source of considerable irritation around the margin of the anus. This irritation may not amount to a pain, but cause more or less itching of a character distinct from that known as pruritus. It is made worse by faecal passages, and is not affected by heat or cold; neither does it come on at night after the patient is comfortably covered and prepared for sleep. Foreign bodies in the rectum, if they be small and not cutting or pointed, may produce a certain amount of itching, but, as will be seen in the chapter upon this subject, the symptoms occasioned by these bodies are entirely different from those known as pruritus. If, however, threadworms and lumbricoids are considered as foreign bodies, an exception may be made to this rule; some of the most exaggerated cases of pruritus ani are due to the presence of these in the rectum. The diagnosis and methods of search for these little parasites are described elsewhere, but no case of pruritus should ever be prescribed for until they have been thoroughly eliminated as an etiological factor. Constipation is considered by many authors as a frequent cause of pruritus ani. Here, again, a symptom is discussed as a disease; constipation, as generally understood, is not a disease in itself, but a condition brought about by a variety of affections, and it may be said to be frequently the result of the same class of pathological conditions which produce pruritus; it is a complication but not a cause of pruritus.

Tumors of the rectum may cause a certain amount of itching about the anus, but, as a rule, they produce entirely different symptoms, such as heaviness, weight, dull aching pain, and tenesmus. Catarrhal diseases of the rectum and anus are among the most frequent causes; whether it be the atrophic or hypertrophic form, pruritus is one of the commonest symptoms. The dry, brittle condition of the mucocutaneous membrane about the anus, described as a symptom of pruritus ani, is nothing more or less than a part of atrophic catarrh of the rectum and anus; and that moist, sodden, whitish condition seen in chronic cases of this condition are the results of the hypertrophic type.

Gonorrhœa of the rectum may be looked upon as a specific form of catarrhal disease of the rectum. It is said to produce pruritus ani, but in a number of cases of undoubted gonorrhœa of the rectum seen by the author not one of them has suffered from any unusual itching, much less the typical form of it, as considered in this chapter. Tertiary and hereditary syphilis may be the cause of pruritus, in that it sometimes produces a condition similar to that caused by atrophic catarrh, viz., a very brittle, dry mucous membrane, always easily torn and becoming irritated upon the least provocation.

Constitutional Causes.—Digestive derangements, improper dietary, rheumatism, gout, uricæmia, diabetes, and hepatitis may all be the causes of pruritus ani. Many patients who are subject to periodical attacks of pruritus ani go for weeks or months without suffering in the least, when suddenly, after some derangement of the digestive functions, especially the development of an acid or fermentative process in the intestinal canal, the symptoms are lighted up and continue until these functional conditions are readjusted.

Certain articles of food or drink, especially shell-fish, strawberries, and highly seasoned condiments are all productive of attacks in individuals predisposed to pruritus ani. Overindulgence in the use of tobacco may also produce it. In some persons any condition or indiscretion which causes a congestion of the liver is very likely to light up an attack.

The constitutional conditions which produce pruritus ani most frequently are rheumatism, gout, and uricæmia. The pathology and etiology of gout are so obscure and little known that one hesitates to speak positively concerning it, but undoubtedly it and pruritus are frequently associated in the same individuals, and remedies which relieve the attacks of gout also relieve the pruritus. Rheumatism and uricæmia, if not identical, are intimately associated in the human economy; gastro-intestinal fermentation is an important element in both. It is often difficult to distinguish between the rheumatic and lithic-acid diathesis. If any one will examine carefully a given number of patients suffering from pruritus, he will elicit the fact that a large percentage of them have suffered more or less from rheumatism or uricæmia; the urine is nearly always extremely acid or loaded with urates, and the itching is almost invariably exacerbated or relieved by an increase or decrease of these phenomena. Excess in diet and drink, or anything which produces an increase of uric acid in the system, or of intestinal fermentation, is likely to bring on an attack of pruritus, and when the constitutional condition has once been relieved the pruritus just as promptly subsides. Sweet wines, champagne, pastry, and an excess of carbohydrate foods will bring on attacks of congestion and itching about the anus in individuals predisposed to uricæmia.

There is strong evidence in favor of the theory that muscular rheumatism is produced by intestinal fermentation and excess of uric acid in the system, and it is certain that cases predisposed to muscular and subacute rheumatism are very frequently the victims of pruritus ani. When they begin to suffer from vague muscular pains, it is always a warning to them that the fires of pruritus are soon to be lighted up, and just as soon as the rheumatic symptoms subside the others are extinguished.

Idiosyncrasies with regard to diet are always to be remembered in studying cases of pruritus ani; in one case an attack was always caused by drinking a cup of Java coffee, though the patient could indulge reasonably in almost every other variety of this beverage. Another was exempt from this disorder except during the strawberry season; with him indulgence in this fruit was always paid for by an attack of pruritus ani. Sea-food, salt meats, and certain fruits affect other patients in the same manner. These all act through disturbances in the digestive tract, and thus prove the constitutional origin of pruritus.

Reflex Causes.—Urethral stricture or inflammation, phimosis, enlarged prostate, stone in the bladder, pregnancy, uterine diseases, or gall-stones may produce pruritus ani.

It is also caused by irritating discharges from the vagina, such as leucorrhœa, gonorrhœa, and the watery secretions from malignant disease. The condition also often follows the establishment of menstruation or the menopause. One should, therefore, in searching for the cause of pruritus, carefully eliminate all such affections before coming to a conclusion in regard to the etiology of the condition.

Treatment.—In the whole range of medical science there is no disease for which so many and various specifics have been recommended as for this; there is hardly a drug in the whole materia medica, or a procedure in the surgery of the rectum, that has not at some time been advised and applied for the relief of this condition. The proof of the real suffering produced by pruritus ani is confirmed by the inconvenience and torture which these patients are willing to undergo in order to be rid of it. It would require a volume to describe the various nostrums, simple and complicated, which have been vaunted as "*sure reliefs for itching piles and pruritus.*" As pruritus is not in itself a disease, but only a symptom of some other pathological condition, the treatment will resolve itself into the management of that condition, and efforts directed toward the relief of itching while the pathological condition is being cured. If there be hæmorrhoids, fistula, fissure, condylomata, stricture, or other pathological conditions about the anus which apparently demand operative interference, it should be undertaken at once, but always with a very careful prognosis so far as the relief of pruritus is concerned. The methods of procedure in such cases are fully described in their appropriate place and need not be repeated here. Where foreign bodies exist in the rectum, whether they be organic or inorganic, their removal will, of course, be necessary. The methods of treating intestinal parasites are described in books on general medicine, but one simple remedy seems so often overlooked that the writer feels called upon to call

attention to it. Lime-water injected into the rectum and drunk freely will invariably destroy threadworms in a very short time. From 4 to 6 ounces should be injected twice a day, and as much should be drunk four or five times daily.

When evidences of reflex irritation are present, the attention of the surgeon should be directed to the removal of their cause. Thorough and persistent dilatation of the urethral strictures, the crushing or removal of stone in the bladder, the radical and proper treatment of uterine diseases, and the surgical treatment of gall-stones should all be promptly and thoroughly carried out. It will often happen, however, that these procedures are insufficient to eradicate the pruritus ani, and one will come back to the old conclusion that it is due more to general conditions than to local or reflex irritations. As to rheumatic, uricæmic, and gouty cases, it is unnecessary to go into any elaborate description of their treatment. Nitrogenous diet, composed of meat, eggs, fish, leguminous and non-starchy vegetables, associated with alkaline diuretics, such as lithia, citrate of potash, and benzoate of soda, together with some form of salicylic compound, will compose the general regimen. Some cases can not take salicylic acid or salicylate of soda, and yet their stomachs bear salophen, salol, or salipyrine quite well. In gouty and uricæmic diatheses piperazine acts remarkably well.

The habits and diet of these patients should be generally altered. In those cases in which pruritus is associated with excessive energy, athletic dissipation, or overwork, these habits should be suppressed and a more quiet life enjoined. In phlegmatic individuals, where there is a tendency to overeating, drinking, indulgence in tobacco and other stimulants, such practices should be curtailed, and moderate, regular exercise insisted upon. When the bowels are constipated they should be properly regulated. If the stools are hard and lumpy, enemata of oil should be given to prevent irritation and traumatism of the margin of the anus. If possible, these patients should sleep between two linen sheets, the bed-covering should be as light as is compatible with comfort, the room should be well ventilated and without any artificial heat.

In those cases due to catarrhal conditions of the bowel, and the number is large, the catarrh should be treated as indicated in the chapter upon that subject. One thing, however, may be mentioned, and that is the fact that the passage of a cold rectal tube through the anus once or twice a day sometimes gives these patients the most unexpected relief; whether this is brought about by dislodging some small foreign body, or whether by a stimulating effect upon the circulation about the anus, or by its reflex influence (as some have claimed for the steel sound in urethral itching), it is impossible to say. Where

there is an excoriation of the mucous membrane inside of the sphincter, the application of pure ichthyol, or sometimes a 10-per-cent solution of argonin, will give rapid and effectual relief and hasten the restoration of the parts to their normal condition.

In the pruritus of liver diseases pilocarpine in small doses sometimes acts almost as a specific; it should be given in triturate tablets ($\frac{1}{20}$ — $\frac{1}{10}$ grain) by the mouth.

Five grains of ichthyol three times a day is said to be very useful in those cases due to the menopause, but the writer has had no experience with it. Bromide of soda has given better results than any other remedy in the reflex types of pruritus. In the large majority of cases, however, regulation of the bowels, nitrogenous diet, intestinal anti-ferments, and some form of salicylates will comprise the general treatment.

Local Treatment.—Local applications are the sheet-anchors during the processes of removing the pathological conditions accountable for pruritus; by them it is possible to relieve the patient's distress, quiet the nervous condition, obtain the rest and sleep so necessary to the restoration of general physical tone, and to retain his confidence during a sometimes tedious and prolonged treatment necessary for the eradication of etiological factors. One of the several means of relief for pruritus, and one which should be employed before any other application is made, is hot water; the patient should be instructed to apply to the anus sponges dipped in water as hot as he can bear for five or ten minutes before retiring. If the itching recurs in the night, this process should be repeated before making any other local application. This will sometimes entirely relieve the symptoms and enable the patient to obtain a comparatively comfortable night's rest. In the majority of cases, however, something more will be necessary.

One of the simplest local applications is blackwash, which has been used for many years as an application for pruritus, and by many physicians is still considered the best and most reliable remedy. It should be applied after bathing with hot water. Carbolic acid in some combination is probably the most universally applicable of all drugs for the relief of the itching; it may be applied in ointments, or solutions in water of from 5 to 20 per cent. An excellent combination of this drug with salicylic acid is:

R Ac. carbolici 5ij;
 Ac. salicylici 3j;
 Glycerinæ 5j.
 M. sec. art.

Sig.: Apply to the parts by camel's-hair brush or cotton swab after bathing in hot water.

The solution should be perfectly clear. A milky cloudiness impairs its usefulness, but a reddish tinge does not. It may be repeated several times during the night, but it is very rare that two applications will not secure a good night's rest, especially if the rectum is cleaned out by a cold-water enema before retiring.

Mathews (*loc. cit.*, p. 499) recommends:

℞ Campho-phenique ʒj;
Aque dest. ʒj.

M. This should be applied as a lotion after the use of hot water, repeating it frequently if necessary; this application is occasionally very effectual but often disappointing.

Chloral hydrate in the strength of 10 to 30 grains to the ounce of glycerin and water sometimes affords almost instant and prolonged relief; and yet there are cases in which it makes the itching worse. An ointment composed of ichthyol 10 parts, boric acid 5 parts, and lanolin 85 parts will be found to act exceedingly well, especially in those cases in which there is an erythematous or eczematous condition about the margin of the anus. Diachylon ointment is also useful in these cases. The following formula laid down by Adler in a recent paper before the American Proctologic Society is an excellent combination and well worthy of a trial in obstinate cases:

℞ Fld. ext. hamamelis fʒj;
Fld. ext. ergot fʒij;
Fld. ext. hydrastis fʒj;
Comp. tinc. benzoin fʒij;
Carbolized olive- or linseed-oil, }
Carbolic acid 5 per cent, } fʒj.

Shake well before using.

Carson recommends 1 dram of powdered camphor to 1 ounce of lard as a specific in pruritus ani, but experience with it has not been favorable; sometimes the suffering was intensified rather than relieved.

Waugh commends very highly the following formula:

℞ Benzoini pulv. ʒj;
Hydrarg. ammon. ʒss.;
Lanolini ʒj.

Sig.: Apply twice a day, avoiding coffee, alcohol, and sweets.

In cases where there are fissure-like cracks in the mucous membrane due to atrophic catarrh or specific affections, the following prescription, recommended by Cripps (p. 278), has given great relief:

℞ Ex. conii	3j;
Olei ricini	3j;
Lanolini	3j.

Nitrate of silver in solutions of from 2 to 25 per cent is often a very useful application for the relief of itching. If applied too often, however, it may produce inflammation or even sloughing of the superficial skin. In a certain number of patients oily preparations, such as ointments, seem to aggravate the symptoms; in such cases washes of one kind or another may give relief. The following formula, recommended by Allingham, is one of the best of these:

℞ Liq. carbonis detergens, }	.....āā f3j;
Wright's glycerinæ, }	
Pulv. zinci oxid., }	.....āā 3iv;
Calamis prep., }	
Pulv. sulphuri prep.	3ss.;
Aquæ	ad. f3vj.

Sig.: Paint over the parts once or twice a day.

Where there is much thickening of the perianal tissues the following is said to be very useful:

℞ Liq. potassæ, }	.....āā 3j.
Ol. cadini, }	
Alcohol, }	

Sig.: Rub into the parts once a day and follow it by a soothing ointment, such as:

℞ Ung. zinci ox.	3j;
Chloroform	3j.

Sig.: Apply freely to the parts and allow the chloroform to evaporate before covering with dressings.

Where there is a tendency to too great moisture about the anus, some sort of desiccating powder should be used during the day to keep the parts dry and prevent chafing. Oxide of zinc and calomel in equal parts, or aristol 10 parts with stearate of zinc 90 parts, are very soothing and healing in this condition. Bismuth, boric acid, resinol, calamine, and talcum powders are also useful for this purpose. The following formula is highly recommended:

℞ Listol	3ij;
Ac. borici	3j;
Talcum purificat	3j.

Sig.: Dust freely over the parts three or four times a day.

Where the parts are dry and fissured, as in eczematous or atrophic catarrhal conditions, it is sometimes possible to obtain great relief by painting them with flexible collodion. One per cent of ichthyol mixed with this is advisable in cases where there is much thickening of the skin.

Ten grains of methylene blue in an ounce of collodion, or in aqueous solution in obstinate cases, will be found very satisfactory. The aqueous solution is preferable when there is much moisture about the parts.

In 2 cases in which the parts were irritated and tender orthoform gave immediate relief.

With all these applications the parts should be protected from rubbing on each other by pledgets of cotton or gauze. The fact is that one is often compelled to run the whole gamut of local applications before the particular one is found which gives the individual patient most relief. Every case of pruritus ani is a problem in itself, and if by chance or good judgment the practitioner selects at his first visit a remedy which will relieve his patient from the tormenting symptom, he will have established his professional reputation in that quarter at once and secured a faithful as well as grateful patron. There are cases, however, reported by reliable authors, in which all these local applications and constitutional treatments have been ineffectual to relieve the intolerable itching.

Before the disease was treated upon a constitutional basis many such cases were seen, and occasionally the most heroic measures were employed for their relief. A strong galvanic current has been applied to the parts, both through sponges and wire brushes, but it can not be said that any radical relief was ever obtained by it. In one or two instances the itching was relieved by the application of the actual cautery at white heat.

Mathews, in a report to the American Proctologic Society, has recounted some cases in which he had failed by all methods of local application to relieve the symptoms, and finally resorted to the removal of the superficial skin for about 1 inch around the anal margin. The writer has done this operation once, not as a matter of necessity but as an experiment for the relief of pruritus ani. Undoubtedly it relieved the symptom, but the protracted healing of the parts, the suffering, and the subsequent contraction of the anus indicated that the procedure is only justifiable in the most desperate cases, and then only after a thorough understanding by the patient of its nature and what it entails.

One other method deserves to be mentioned, and that is deep and persistent pressure upon the parts. Allingham first discovered that pressure over the anus would relieve the sensation of pruritus, and advised the introduction of a specially formed plug into the anus at

bedtime, and keeping it there by a bandage throughout the night. This has been tried with success at times, but the results have more frequently been disappointing.

The X-ray and high frequency current are now being used very extensively in the treatment of pruritus. The author has seen great benefit follow the use of the ray in a few cases where the usual remedies had failed. The number has not been sufficiently large, however, to classify them and thus indicate the exact type in which it is likely to prove beneficial, but it appears worthy of trial in obstinate cases. Great care should be exercised in its use, however, lest too long séances or too strong rays result in burns which will make the condition practically incurable. As to the high frequency currents the writer has had no experience; but excellent results from its use have been reported by Piffard, Denoyes and others (*Les Courants de Haute Fréquence*, p. 262).

In conclusion, it may be said that if catarrhal, constitutional, and digestive diseases are recognized and treated as the causes of pruritus, there will be little difficulty in the management of these cases. The itching can be controlled in a large majority of cases by the application of the carbolic and salicylic mixture, and although the conditions which originate the pruritus may recur after having been once cured and the pruritus with them, the same management and treatment will effect their relief.

CHAPTER XVI

HÆMORRHOIDS—PILES

BEFORE the history of medicine began a knowledge of hæmorrhoids existed. In Egypt there were "pile doctors" before Joseph was sold into bondage. "The Lord will smite thee with the botch of Egypt, and with the emerods" (Deut. xxviii, 27), is the threat of Moses against an impatient and a rebellious people. "And he smote the men of the city, both small and great, and they had emerods in their secret parts" (I Sam. v, 9), "And he smote his enemies in the hinder parts: he put them to a perpetual reproach" (Psa. lxxviii, 66), are quotations from Holy Writ descriptive of the afflictions of the Philistines for their desecration of the ark of God, and indicate the views of antiquity concerning a disease most prevalent among the civilized nations of to-day.

The term *hæmorrhoids*, according to its derivation, signifies a flow of blood, a hæmorrhage. It is not altogether appropriate in the sense in which it is used, for frequently the disease exists without any bleeding whatever. It has also been applied to various conditions. For instance, we read of "urethral hæmorrhoids," which are simply papillomas; "uterine hæmorrhoids," a roughened and congested state of the os uteri resembling the mucous surface of an internal rectal hæmorrhoid (Simpson); and "vesical hæmorrhoids," a varicose condition of the mucous membrane about the neck of the bladder. By common consent, however, the word, when found in general literature and unqualified by any other term, means some hypertrophy or varicosity of the vessels at the lower end of the rectum.

The term *Piles*, which means a swelling or tumor, and is always applied to the rectum, is more correct. For some unknown reason the latter has become a sort of vulgar expression, and is not frequently employed at the present day, but in this work the two will be used interchangeably.

Definition.—Hæmorrhoids or piles are tumors chiefly composed of dilated blood-vessels or blood-clots situated beneath the mucous membrane or muco-cutaneous tissue of the anus or rectum. There may

be constant or periodic bleeding or there may be none; there may or may not be pain, protrusion, and difficulty in defecation; the tumors may be entirely outside of the rectum, they may be inside, or they may be both inside and outside.

The cardinal features are, a dilatation of the veins, a swelling, and an increase in the connective-tissue stroma by which the convoluted vessels are supported.

ETIOLOGY

For a disease which has been known so long, studied so much, and so thoroughly written about, it seems strange that no very definite and accepted theory as to its cause has been accepted. There is scarcely a condition or disease that has not at one time or another been said to produce it. Its causes are both predisposing and exciting.

Predisposing Causes.—*Age.*—The disease is found at all ages. The cases found in infancy are comparatively rare, and yet they are indisputable; Allingham has reported a case of venous piles in a child three years of age. In the summer of 1892 the author exhibited at his clinic two children, one two years of age with an inflammatory hæmorrhoid, the other between two and three years having well-developed internal venous hæmorrhoids. More recently he has seen this condition in a child six months old. Trunka reported 39 children below the age of fifteen years who were affected with hæmorrhoids; of these, 5 were less than one year of age.

At puberty and middle age hæmorrhoids are very frequently manifested. This is explained by the fact that the environments, habits, and constitutional conditions at these ages are particularly inclined to bring on engorgements of the hepatic system and of the pelvic veins. The menstrual periods in women, the development and exercise of the sexual organs in both men and women, the tendency to overeating and to dissipation, child-bearing and childbirth, muscular straining in exercise or labor, and the constitutional diseases which are prone to attack at this period of life, all conduce to the formation of hæmorrhoids. This period of life, therefore, may be called a predisposing cause.

As the patients grow older many of these influences disappear, but the absorption of fat, relaxation of the muscles around the rectum, constipation, hardening of the liver, and atheroma of the blood-vessels contribute to the causation of the disease. For these reasons old age may be considered a predisposing cause.

In women the menopause is looked upon as an etiological factor, because a periodic loss of blood ceases and the hæmorrhoidal flux some-

times appears as a sort of vicarious menstruation. The theory of change of life, however, hardly sustains this doctrine.

Age, therefore, may be said to be a predisposing cause only inasmuch as it affects the patient's habits, environments, and physical conditions. The disease is most frequent in middle life, next in old age, and least of all in children.

Sex.—The majority of cases of hæmorrhoids found in hospitals and clinics is undoubtedly among males; the proportion is about seven males to four females. This preponderance may be more apparent than real, owing to the fact that women are more diffident about consulting physicians for rectal troubles than men, and being accustomed to the loss of blood at menstrual periods, do not attach so much importance to it as do men.

There are some reasons why women should be more frequently afflicted with hæmorrhoids than men. The monthly congestion of the pelvic organs, the pressure of displaced or pregnant uteri upon the rectum, the traumatism of childbirth, the frequency of fibroids and ovarian tumors, and the habitual constipation in them, all tend to cause dilatation and hypertrophy in the veins and produce hæmorrhoidal disease. On the other hand, men are more given to muscular and nervous strain; they more frequently indulge in overeating and drinking; they are more often the victims of intemperance and excessive venery, and from these causes, no doubt, the disease arises. Stricture of the urethra and stone, which are more frequent in males, may also predispose to the disease in this sex.

The causes which predispose women to hæmorrhoids are somewhat balanced by the monthly menstrual flow. This theory is borne out by the fact that they suffer very much more frequently from hæmorrhoids during periods of menstrual suspension, gestation, and after the menopause, than at other times. Bodenhamer states that it is no unusual thing to observe them at each recurring menstrual period, both conditions coming on and subsiding together; and that he has seen many cases in which the menses ceased for several months and the patient had regular periodical bleeding from hæmorrhoids during this period. This compensating action between menstruation and hæmorrhoidal bleeding may account for the disparity between the two sexes in this disease.

Occupations, Habits, and Environments.—These have a strong predisposing influence in the causation of hæmorrhoids. The reason why the disease is so rare among children is due to the fact that their occupations and habits are regular and their diet is uniform; there is no nervous or muscular strain, and therefore no cause for the hæmorrhoidal condition except in rare instances.

Those occupations which require severe muscular strain, heavy lifting, constant standing or sitting in the erect posture, are very likely to bring on the disease. Railroad and street-car conductors, truckmen, laborers, and miners are frequently its victims. The desk-worker is likely to become sedentary and phlegmatic; his duties conduce to constipation, and constant bending over crowds the abdominal organs down upon the rectum, thus interfering with the circulation and predisposing to hæmorrhoids.

The habits, however, have much more to do with the production of hæmorrhoids than occupation. It is well known that the more civilized nations become, the more frequently are they affected with this disease. Sedentary habits, excessive eating, indulgence in stimulants and the luxuries and comforts which are enjoyed by the higher classes, all tend to the production of piles. The large amounts of rich food and drink consumed by this class surcharge the hepatic circulation, and sooner or later bring on a congestion of the hæmorrhoidal veins which ends in hæmorrhoids. Good living, full diet, and moderate drink are not necessarily productive of the disease, provided enough active exercise is taken to use up the material absorbed. Frequently patients live to a good old age amid luxuries, wealth, and self-indulgence, never experiencing any hæmorrhoidal affection until they give up business and begin to lead a sedentary life, when suddenly the condition appears. The superfluous carbohydrates are not utilized, they congest the liver, and through it the rectal veins.

It seems somewhat contradictory to these facts to find the disease as frequently in thin, anæmic, temperate individuals as in the plethoric; the explanation of this is that muscular and nervous exhaustion result in general relaxation and dilatation of the venous system, and consequently piles develop.

Heredity.—"That heredity predisposes to hæmorrhoids is a fact established beyond all doubt" (Bodenhamer). That successive generations of a family suffer from this disease is explained by the similarity of environments, habits, and constitutional conditions. Their diet, methods of life, and vocations are very much alike from one generation to another, and therefore they suffer from the same diseases. While there seems to be some hereditary influence in the disease, it is a heredity of predisposing causes more than of the disease itself; if it were the latter, children would be frequently born with these dilated veins and hypertrophies instead of developing them later in life.

Temperament.—Patients suffering from hepatic diseases are often the subjects of hæmorrhoids. It is well known that melancholic, choleric, sallow, depressed individuals generally suffer from some dis-

order of the liver. Temperament is not the cause of piles, but the same pathological condition which brings about one also causes the other.

Climate and Seasons.—These have undoubtedly some influence in the production of hæmorrhoids. The disease is comparatively more frequent in the very hot and cold than in the temperate zones. The explanation of this lies in the fact that in hot climates the patient is subject to congestion of the liver and malarial conditions, together with a relaxation produced by heat and lack of exercise. In the cold climates the people are active, subjected to muscular straining, and on the move constantly to keep themselves warm; besides this, they use alcohol and much external clothing to protect themselves from the rigor of the weather; hence, the difficulties of removing the clothing and of reaching convenient places for stool engenders a carelessness and irregularity in this regard productive of hæmorrhoidal disease. Here again it is not so much the climate (hot or cold) as the habits of the individual.

So also with the seasons. In the spring hæmorrhoids are more likely to develop than at other times, because the system can not consume the amount of hydrocarbons in hot weather that it does in cold, and when warm weather comes on suddenly the dietary habits can not be adjusted, the portal circulation becomes congested, and hæmorrhoids appear.

That hæmorrhoidal disease is more marked and frequent in those countries in which there are frequent and sudden changes in temperature is better explained by these facts than by the theory that the blood is suddenly driven from the surface into the internal organs and veins, thus causing piles. In the many cases in which cold packs have been used for various conditions, not a single case has been reported in which the sudden chilling of the surface has caused hæmorrhoids; if the sudden driving in of the surface blood would cause the disease it certainly ought to be seen in these cases.

Anatomical Causes.—Man is the only animal in which this disease is at all frequently found; occasionally dogs suffer from it, but it is usually in fat, lazy house dogs or very old ones that take no exercise, but lie around, eat whenever opportunity offers, and are always constipated.

The one essential anatomical feature that distinguishes man from other animals is the erect posture. He is always upright during the larger portion of the twenty-four hours, and as the weight of the blood column is proportionate to its height, and the cardiac force must be sufficient to lift this weight, the distending force that is exercised upon the veins can be realized. Valves in a vein relieve the distention to a certain extent by preventing backward pressure, but veins of

the portal system have no valves; they are practically upright in all positions except when lying down, and if one is sitting constantly and leaning forward over the desk or sewing-machine, the abdominal organs are pressed downward and backward upon them, thus causing obstruction to the blood current.

The blood-vessels of the rectum puncture the walls of the gut about 3 inches above the anus, passing through the muscular walls in little buttonhole-like slits, and then divide into numerous branches which are distributed to the lower end of the organ; Allingham claims that these little slits serve the purpose of valves for the veins. Verneuil, on the other hand, claims that they act as obstructions to the venous circulation, and whatever produces spasm or peristaltic action in the muscles causes constriction of the veins, congestion, and hæmorrhoidal disease. The thickness of the arterial walls protects them from compression, and thus the blood supply remains constant while its return flow is obstructed. Verneuil's view is much more rational, because in order to act as valves these muscles would have to be in a constant state of tonic contraction, which we know is not the case. Moreover, admitting for the moment that they do act as such, it is perfectly clear that there would be but one valve between the liver and the rectum, which would be very ineffectual. From these facts it appears that the constant upright position of the human race, inducing thereby a constant pressure from a blood column of 14 inches or more in height, is the most plausible explanation of the prevalence of hæmorrhoidal disease among men. The weight of this column and the cardiac force necessary to lift it, being constantly active, it is not at all surprising that the thin-walled veins of the rectum are frequently varicosed.

* The loose attachment of the mucous membrane of the rectum to the muscular walls leaves cellular spaces between the two in which the veins can be stretched in length and dilated in caliber, thus forming the convolutions which go to make up a true hæmorrhoid.

Exciting Causes.—*Constipation.*—The passage of a solid fæcal mass along the intestinal canal distends it more or less, and thus squeezes out the blood which is in its veins. In the sigmoid flexure and colon the arterial and venous supply proceeds in a circular course around the gut, anastomosing freely; fæcal passages and peristaltic action here simply empty the blood-vessels by forcing the blood out of the veins in the proper direction; but in the rectum, where the blood-vessels run up and down and are very superficial, the fæcal mass sliding over the mucous membrane presses upon and strips or milks them, as it were, in the opposite direction to the venous current, thus not only obstructing the circulation, but also by backward pressure producing a mechanical strain upon the veins and the little blood pools in

which they originate. This is probably the chief exciting cause of the disease.

The increased amount of blood in the parts causes hypertrophy of the connective tissues, new capillaries develop, and thus the hæmorrhoidal tumor is formed. After this has taken place, the distention produced by straining, or the passage of the fæcal mass, causes rupture of the thin vessel walls, and there results what is known as bleeding piles. It is not traumatism or friction by the fæcal mass, as a rule, but distention which causes hæmorrhage from piles. Not only does constipation act in this mechanical manner, but it also produces a general congestion of the rectum in which the hæmorrhoidal vessels take part. It necessitates straining at stool and resort to cathartics, the habitual and injudicious use of which is frequently followed by the development of piles. Especially is this true of the resinous drugs.

The old practice of attributing every disease to torpidity of the liver and bowels, and beginning all treatment with a large dose of calomel, salts and senna, gamboge, or aloes has frequently resulted in attacks of hæmorrhoids in patients who had no knowledge of their previous existence. Warm injections are also productive of hæmorrhoidal disease by causing an excessive flow of blood to the parts and frequently failing to induce an active movement which would relieve this.

Drugs.—In addition to the resinous cathartics other drugs are known to be productive of hæmorrhoids. Such substances as apiol, cantharides, aloes and myrrh, and savin, all act by producing congestion of the pelvic veins, more or less increased peristalsis, and consequent distention of the hæmorrhoidal vessels. Many hæmorrhoidal fluxes, called vicarious menstruation, are only the result of such drugs.

Diet.—Certain articles of food are active causes in hæmorrhoidal attacks. Substances which irritate the mucous membrane, excite peristalsis, spasm of the sphincters, and bearing-down, are very likely to induce them. Such articles as aromatic spices, peppers, mustard, highly seasoned sauces, radishes, water-cress, tamales, and pickles will frequently bring on or aggravate piles.

Bodenhamer claims that the habitual use of oatmeal is very effective as an exciting cause, but the author is not able to confirm this statement. Wines, malt or alcoholic liquors add largely to the mass of fluid in the veins, produce congestion of the liver, and along with this a similar condition in the rectal veins which results in hæmorrhoids. Tea, when used to excess, may produce hæmorrhoids by its constipating effects, but coffee very rarely does so.

Idiosyncrasies with regard to diet occasionally lead to the development of hæmorrhoids from the simplest articles of food. What will

induce a hæmorrhoidal attack in one, hundreds of others may use with impunity. As a rule, too many carbohydrates induce the disease, and foods containing excessive amounts of refuse material do so through the large hard stools which they produce. Such lines of diet, while advantageous in certain conditions, are deleterious in patients predisposed to hæmorrhoidal disease.

Strain.—Thrombotic hæmorrhoids are nearly always the result of muscular strain. They may occur from lifting heavy weights, from a misstep or fall with efforts to recover one's balance, from bicycling, dancing, sweeping, or various forms of muscular strain. All efforts that require forcible action of the abdominal muscles are associated with action of the pelvic and anal ones in order to counteract the downward pressure of the intestines in the pelvis. This muscular strain from above and below causes pressure upon and distention of the vessels of the rectum, and may cause their dilatation or rupture. In the latter case blood is poured out into the cellular tissues, where it finally clots and forms a thrombotic hæmorrhoid.

Straining or long sitting at stool are very frequent causes of the disease among city people where the toilet-rooms are luxurious. Men who take their pipes and morning papers to the closet with them, acquire the habit of sitting there and straining in a position in which all support is removed from the veins. This habit persisted in from day to day unquestionably brings on varicose external hæmorrhoids, and has more or less influence in the production of the internal variety. The same effect is produced by habitually sitting upon a rubber ring. The buttocks are pulled apart, the anus drops down, there is no external support from the folds of the buttocks or from pressure upon the seat, the veins consequently become distended, and hæmorrhoids ensue.

Clothing.—Constrictions about the waist, especially tight bands for supporting the trousers, or undue lacing, the wearing of heavy skirts supported by the hips, all have their effect in aggravating, if not in producing, hæmorrhoidal disease.

External Causes.—Whatever causes congestion about the rectum or anus may act as an exciting cause of hæmorrhoidal disease. Wounds, injuries or contusions, the use of rough and irritating detergent substances, such as newspaper, corn-cobs, etc., the presence of foreign bodies, threadworms, and other larvæ inside the anus, or pediculi and parasites upon the external surface, may all produce the disease.

Other Diseases.—Hæmorrhoids may be a complication or the result of other pathological conditions in the rectum or intestines. Ulceration or stricture of the intestine or urethra may result in this disease, either through the congestion which it produces or the straining neces-

sary for micturition or defecation. With regard to stricture of the rectum as a cause of hæmorrhoids, the fact may be recalled that the most usual site for strictures is just about the point where the arteries and veins penetrate the muscular wall of the gut; any inflammatory condition about this region results in a constriction, due first to spasm of the muscles, and secondly to the deposit of lymph and fibrous tissue which obstructs the circulation. Such obstruction always affects the veins more than the arteries, because the walls of the latter are stiffer and do not yield so readily to the pressure; in the veins there is no constant pulsation to prevent the constriction, but simply a steady, gentle flow, and little by little they become encroached upon until they may be almost occluded by the same processes which the artery has been able to resist. Thus, the vein being constricted and the artery still pouring blood into the hæmorrhoidal area, the force finally falls upon the venous walls, causing distention, hypertrophy, and development of hæmorrhoidal tumors. Generally, however, in strictures of the rectum the hæmorrhoidal complication is a matter of such small moment compared with the etiological cause that little attention is paid to it; this is a proper view of the situation, because the cure of hæmorrhoids would be of no benefit to the patient if a progressive stricture is left to take its course.

Other uterine and genito-urinary diseases, such as retroversion, anteversion, procidentia, cystitis, prostatitis, urethritis, etc., may bring on attacks of piles, but the latter generally subside as soon as the cause is removed.

Diseases of the heart, liver, and kidneys must also be taken into account in a study of the causes of hæmorrhoids. Valvular insufficiency of the right side of the heart no doubt has some influence in producing piles through the backward pressure and congestion which it causes in the liver, and feeble cardiac action induces them through sheer lack of force to drive the stagnating blood through the vessels.

Congestion or cirrhosis of the liver by obstruction to the portal circulation increases backward pressure in the hæmorrhoidal veins, causing their distention and the development of hæmorrhoids. In this class of cases hæmorrhage from the tumors is very frequent and no doubt often salutary. Where the liver is surcharged with blood, some overflow is beneficial, and these bleedings act as spontaneous venesections. Those who suffer from hepatic disease and hæmorrhoids often feel buoyant and comfortable after a marked hæmorrhoidal flux, and when this does not occur every three or four days they become morose, depressed, and suffer from digestive troubles; some patients of this kind, in whom operations have checked the hæmorrhages, grow worse, develop anasarca, and die very soon. Some of the older surgeons, ob-

serving this, suggested methods for the reestablishment of the hæmorrhoidal flow. It is wise, therefore, in these conditions to allow the periodic bleedings to continue so long as they do not immediately endanger life, and confine ourselves in treatment to those methods which prevent inflammation and avoid strangulation.

In acute congestion of the kidneys and lungs hæmorrhoids and hæmorrhage therefrom may occur. If a sufficient quantity of blood were lost in the incipency of these diseases, it might be of some temporary advantage to the patient, or even abort the disease, but after this time any loss of the vital fluid is a serious complication. The occurrence of piles is easily explained in lung affections, but between them and diseases of the kidneys it is difficult to make out any etiological relationship.

Certain diseases of the spinal cord appear to have some causative influence in the production of hæmorrhoids. They are likely to occur in patients who suffer from lateral and posterior sclerosis and who are markedly constipated. Peristaltic action is almost always deficient, and the accumulation of fæcal masses in the bowels and rectum is a very constant accompaniment of the spinal disease. It may be in this indirect method, or through their influence upon the walls of the vessels, that these diseases act, but in some way they certainly appear to have an etiological influence in the production of hæmorrhoidal diseases.

In acute catarrh of the rectum there is a congestion, and a certain amount of dilatation of the hæmorrhoidal vessels, which results in capillary hæmorrhoids. This inflammatory process, however, is diffuse, and consequently fails to produce those localized dilatations and congestions which characterize the true hæmorrhoidal disease.

Chronic atrophic catarrh, however, may produce it. The inflammation rarely proceeds lower than the mucous membrane itself. There is no submucous deposit constricting the blood-vessels and obstructing the circulation, but there is atrophy of the follicles, deficiency in the mucous secretions, increased friction in the passage of the fæcal masses, accumulation of these masses in the rectum, and a generally constipated condition, all of which tend to the production of piles.

In the hypertrophic form these conditions are reversed, and consequently in this disease hæmorrhoids are seldom seen unless they have existed previous to the development of the catarrhal process. Unfortunately the hæmorrhoids are frequently mistaken for the chief cause of offense in patients who suffer from these conditions, and operations for their relief signal fail to cure.

Emotions.—The effect of the emotions in the production of hæmorrhoids has been referred to by many authors. Grief, fear, anxiety, and

nervous strain have all been known to bring on attacks. No satisfactory explanation has yet been given of this fact.

It seems probable that in the majority of instances the piles existed before the emotional disturbance took place, and that through some sudden cardiac activity or relaxation of the sphincter muscles protrusion and hæmorrhage have been brought on. A hæmorrhoidal tumor is not simply a dilated vein, but an aggregation of varicose vessels held together by a network of connective tissue; it is impossible to suppose that it can be produced in an instant by any excitement. Thrombotic piles may be so produced, but true venous hæmorrhoids can not. This fact is important in its bearing upon suits for damages in railroad and other accidents.

Spasm and Atony of the Sphincter Muscles.—The condition of the sphincter muscles has sometimes been referred to as an etiological factor in the production of hæmorrhoids. One can understand how atony of the sphincter would allow more room for dilatation and hypertrophy in the lower end of the rectum by the removal of its support from the vessels; but how spasm of the sphincter can act as an etiological factor, except in cases where there is a prolapse of the mucous membrane of the rectum, is difficult to comprehend. Undoubtedly such a spasm will produce a strangury, swelling and increased inflammation in a prolapsing hæmorrhoid, but it does not produce the pile. Where a fold of mucous membrane prolapses through a spasmodic sphincter, it may be caught and its circulation be so obstructed that the veins become dilated, the parts hypertrophied, and a hæmorrhoid may result, but such a condition is very rare.

In conclusion, one may enumerate the etiological factors in the production of hæmorrhoids in the order of their importance as follows: Erect posture, constipation, improper diet, muscular strain, and diseases of the liver, spinal cord, genito-urinary and uterine organs.

NOMENCLATURE.—In literature there are references to a large variety of hæmorrhoids described under special names, which, although superfluous, it is well to know. They are as follows:

External Hæmorrhoids.—Those located at the margin of the anus entirely outside of the rectum.

Internal, Blind, or Occult Hæmorrhoids, Hæmorrhoids Cæcæ.—Those seated above the muco-cutaneous border and entirely inside of the anus.

Interno-external, Mixed, or Compound Hæmorrhoids.—Those situated partially above and partially below the muco-cutaneous border.

Bleeding or open piles, Hæmorrhoides Fluentes seu cruentæ.—Those from which there is a loss of blood.

Accidental Hæmorrhoids.—Those which are produced by some acci-

dent or injury, either externally or within, but which develop suddenly and are either cured or pass away spontaneously in a short time.

Constitutional Hæmorrhoids.—Those due to some constitutional condition, such as cirrhosis of the liver, congestion of the lungs, or cardiac insufficiency.

Arterial Hæmorrhoids.—Those in which the tumor is chiefly composed of arteries instead of veins.

Venous Hæmorrhoids.—Those composed chiefly of convoluted veins.

Capillary Hæmorrhoids.—These are small raspberry-like tumors composed chiefly of small capillary blood-vessels covered with a very thin and fragile mucous membrane which is easily torn.

Fleshy Hæmorrhoids, Connective-tissue Hæmorrhoids; Cutaneous Piles.—These are composed chiefly of connective tissue without much vascular development. They are always external, and generally the result of an inflammatory condition in one of the muco-cutaneous folds about the anus. Hypertrophy of the anal papillæ is sometimes spoken of as fleshy hæmorrhoids, but this use of the term is incorrect.

Itching Piles.—This term is applied to a number of conditions, but chiefly refers to those cases of pruritus ani which are associated with hæmorrhoidal disease. It implies that the itching is due to the piles, a very unwarranted assumption, but one which is firmly rooted in the popular mind.

White Hæmorrhoids.—Richet has used this term to describe a chronic condition of piles in which the mucous membrane has assumed a muco-cutaneous character and the hæmorrhages have been supplanted by a periodic or constant discharge of mucus (Irish Hospital Gazette, July 12, 1874).

Inflammatory Hæmorrhoids.—This term is applied to any hæmorrhoids which are in a state of inflammation. It should be confined to that variety which is due to an acute inflammation in the muco-cutaneous folds about the margin of the anus.

Classification.—Hæmorrhoids are broadly classified as *external* and *internal*. Those above the margin of the anus and out of sight are called internal, and those below and in full view are called external. The terms, however, have a wider and more definite meaning from an anatomical point of view. By internal hæmorrhoids are understood those which are developed from the internal or superior hæmorrhoidal vessels; by external, those which come from the external or inferior ones. Piles do not develop from the middle hæmorrhoidal veins. It will be remembered that in the normal condition the superior hæmorrhoidal vessels are limited by the muco-cutaneous border of the anus; that the little pools in which the veins originate are situated just above this margin in the submucous tissues, and that their connection with the

external veins is through the most minute venous capillaries. So long as the sphincter is normally contracted even these small capillary communications are practically occluded. When it is relaxed the veins of the two systems can freely communicate. After this has taken place both sets of vessels may become involved in the same tumor and the result is a *mixed hæmorrhoid*. Thus we have a third variety, the symptoms and characteristics of which are simply a combination of those found in the other two. They are usually treated as internal hæmorrhoids, and we shall so consider them.

EXTERNAL HÆMORRHOIDS.—For the purposes of discussion and a clear understanding, external hæmorrhoids may be classified as thrombotic external hæmorrhoids, varicose external hæmorrhoids, inflammatory external hæmorrhoids, connective-tissue hæmorrhoids.

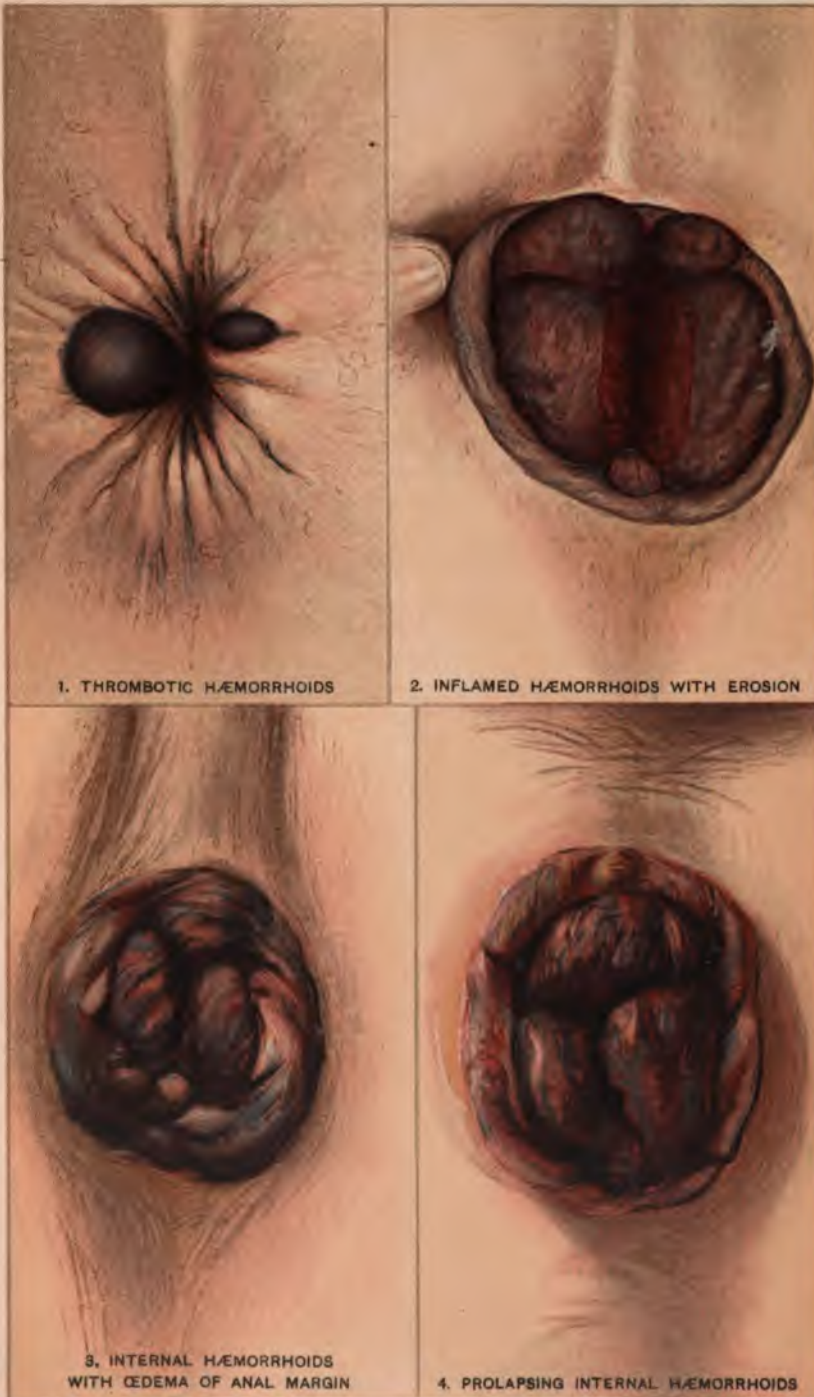
Thrombotic External Piles.—These are small oval or round tumors situated just beneath the skin or muco-cutaneous surface. The color of the overlying tissue may be unchanged, or it may be a light red, varying from this to a dark blue, according to the thickness of the covering and the amount of distention. They vary in size from that of a small pea to a walnut (Plate IV, Fig. 1), and may be single or multiple.

They come on suddenly with a sharp, cutting pain, gradually increase in size, and usually attain their full growth within a few hours. They may be perfectly round like a shot beneath the skin, or they may be elliptical, pear-shaped, or crescentic. The shape and consistence of the tumors will depend largely upon the density of the tissues in which they occur. When they develop in the subcutaneous fatty tissue outside of the margin of the anus they are generally globular and not very dense or hard. When they occur in the muco-cutaneous folds they are pear-shaped, hard, and painful.

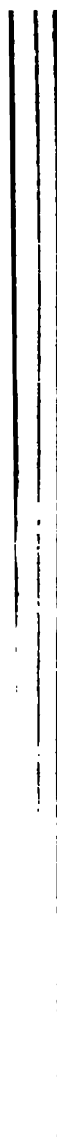
They are produced by clotting of blood in a varicose vein, or more generally by the rupture of a vessel and extravasation of blood into the cellular tissue surrounding it. Their gradual enlargement is explained as follows: a small rent occurs in the vein due to muscular straining, traumatism, or shock; the blood continues to ooze from such an opening, gradually distending the cellular tissue surrounding the parts, and thus the tumor grows and the blood-clot becomes firmer until the pressure is sufficient to check the hæmorrhage. Where the pile is due to clotting in the vein there is no real tumor but a venous stasis followed by the formation of a small indurated mass at the spot, only recognizable by touch.

Symptoms.—The patient while straining at stool, at some athletic or laborious exercise, while standing, or sitting on a perforated seat, feels a slight pain, like the prick of a pin, about the anus, or has the sensation of something having given way. If he examines himself short-

PLATE IV.



TYPES OF HÆMORRHOIDS



ly afterward he will feel a small swelling in the region of the pain. After the first sting the pain is not acute for a while, but as the tumor increases in size a sense of tension followed by aching and throbbing ensues. The pain and tension increase for the first few hours, the patient is unable to sit down with comfort, and the movements of the bowels are distressing. With the application of heat or cold, and after twelve to twenty-four hours, the acuteness of the pain decreases, but a sensation of weight and aching continues.

If the tumor is a small one and not situated within the grasp of the sphincter, these symptoms will gradually grow less and less until they entirely disappear, but if the hæmorrhage has been of considerable size, or if it is in that portion of the anus where the muco-cutaneous tissue is closely attached to the muscle, the pain and tension will be greater, exciting spasm of the sphincter, and the patient will not be so quickly relieved.

If left alone these hæmorrhoids may take one of three courses. The whole thing may become absorbed and pass away, a very rare although happy outcome; the clot may become organized, and remain as an encysted body, which sometimes becomes calcified, giving considerable inconvenience, and at others producing nothing more than a knowledge of its presence; it may become infected, resulting in an abscess, or finally in a fistula of some variety. The method of infection is through the glands of the skin and muco-cutaneous tissue. The extravasation occurs so near the surface that the mouths of these glands communicate with the invaded area, and the infectious germs which are always present in these glands and hair follicles, finding a congenial medium in the clot and serum surrounding it, thus develop an infection with its consequent results. Where this takes place the condition then assumes the aspect of a perianal abscess, and no longer belongs to the category of hæmorrhoids; such abscesses when opened discharge masses of broken-down clots clearly showing their origin.

Of these courses only the first can give a satisfactory result. Where the clot is encysted or becomes calcified, it is always a source of irritation; especially is this so if it is high enough up to be within the grasp of the external sphincter. Here it acts exactly as a foreign body, causing spasm of the muscle, giving pain when the bowels move, and often creating distinct discomfort when the patient sits upon a hard chair or rides horseback. It is not necessary to go into detail with regard to the unfortunate results when they have become infected and produce abscesses or fistulas.

Treatment.—Temporizing with this variety of piles is a very faulty policy. There is but one sure and scientific method to deal with them, and that is immediate enucleation of the clots; these are sometimes sin-

gle and globular, at others they are multiple, irregular in shape, and distributed throughout the convolutions of the vein. The treatment, however, is one and the same. The parts should be cleansed with antiseptic precautions, and a 2-per-cent solution of cocaine injected hypodermically into the swelling. An incision should then be made vertically in the line of the radial folds well down into the tissues, exposing the clot, which should then be carefully seized with a tissue forceps and dragged from its seat.

Squeezing of the swollen and œdematous tissues in order to force the clot out is wrong, inasmuch as the bruising and traumatism will cause congestion in the parts and delay healing. Where there is considerable hypertrophy and œdema of the connective tissues, and numbers of these little thrombi, one may with advantage catch these tissues and carefully dissect them out with scissors until all the clots have been removed and the swollen mass reduced to its normal size. This, however, is rarely necessary. Usually if one places his left forefinger within the anus and presses down gently from above, while scraping the tissues with a dull rectal scoop, the clots will slip out one after the other until they are all removed. After this is done, a small piece of iodoform gauze should be crowded into the cavity, and pressed well between the lips of the wound; it may be covered with flexible collodion for the first twenty-four hours, in order to protect the parts in case of a movement of the bowels. This packing of the cavity is not intended to check hæmorrhage, for practically there is none; but it is designed to prevent oozing and reproduction of the clot, which is very likely to occur if the edges of the wound are sewed together or allowed to become approximated immediately. The fear of producing fissure by this method is absolutely unfounded; the incision rarely goes more than a few lines above the lower margin of the external sphincter, the wound is not within its grasp, and if asepsis is properly observed it heals in two or three days.

Some authors advise cutting away these hæmorrhoids and suturing the skin together. Where the thrombus occurs in an already well-developed skin-tab this may be done. The objection to this method is that which operative surgeons are urging against through and through suturing of skin wounds in other portions of the body. There is no doubt that the skin and its emunctories are the hiding-place of many septic and infectious germs, and the passage of sutures and needles through this tissue is very likely to carry infection into a wound. This is especially true about the anus. Occasionally excellent results are obtained in plastic operations in this region, but every operator must admit that it is the exception rather than the rule that he fails to have a little pus around sutures in these parts. Subcutaneous sutures are very difficult

to apply here, and the few attempts to do so have proved unsatisfactory; therefore, until a method is perfected which will avoid the dangers of this infection, it will be better in the treatment of thrombotic hæmorrhoids, whether large or small, to remove the thrombus and hypertrophied portions, and pack the wound as advised above.

The removal of the clot gives almost immediate relief to the pain. On the following day, when the gauze is removed, the parts will appear perfectly clean and the wound like a fresh cut. The edges being then allowed to approximate, they rapidly heal, sometimes in two or three days, and the patient is perfectly well. This method of treatment applies quite as well to the encysted and calcified thrombi as to those just formed, and should be carried out at the first examination. A patient with such a condition should never leave the office-table until the clot has been removed. It is very simple to say to them: "You have a little clot here which needs to be let out; this can be done with no more pain than the pricking of a needle," and no one will object to it. It may be thought wise by some operators to impress their patients with the gravity of their condition by magnifying this little procedure into a surgical operation, and thus justify themselves in charging a proportionately large fee for the same. The conscientious surgeon, however, will never descend to any such scheme or trickery to augment his professional reputation or add to his bank account.

These tumors being practically without the grasp of the sphincter, it is unnecessary to dilate this muscle in their treatment. When there are more than one they should all be treated in the same manner at one sitting. When these piles exist in connection with internal hæmorrhoids, some authors advise leaving the former alone until an operation for internal hæmorrhoids can be arranged, and do them all at once. This method of procedure seems inadvisable in acute cases, because every day that one of these little clots remains beneath the skin or muco-cutaneous tissues about the margin of the anus, just so much longer is the patient exposed to the dangers of infection, abscesses, and fistula. They have no connection with internal hæmorrhoids, and as the latter are treated in the majority of instances by open methods, necessitating a certain amount of suppuration, this is more than likely to infect the area from which the thrombus has been removed, and cause delay in healing or ulceration at these points. In such cases the clot should be removed from the thrombotic hæmorrhoid upon the first examination, and the patient advised to wait until the wound has healed before having anything done for the internal hæmorrhoids.

Varicose External Hæmorrhoids.—This variety consists in a varicose condition of the subcutaneous veins surrounding the margin of the anus.

Any one who has operated about the rectum, or who has ever observed these parts while the patient was bearing down, must have noticed how easily the external plexus of veins becomes dilated and distended under these circumstances. This dilatation takes place at every movement of the bowel when there is any straining.

It is therefore very common in people who are constipated or who sit for long periods in one position, especially upon perforated seats or at stool. The veins are equally dilated and the circulation continues, although impeded somewhat by the loss of elasticity in the vessel walls. Like varicose veins of the leg, they are only present when the patient is in the proper position. In sitting, squatting, or straining with the abdominal muscles they appear, and sometimes reach enormous dimensions, forming as it were a regular crown of hæmorrhoids around the anus; and yet, immediately after the horizontal position is resumed and the straining ceases they disappear entirely.

They may also be caused to disappear even in the sitting or squatting posture by firm pressure upon the parts, showing that there is very little increase in the connective tissue and no permanent hypertrophy. This sometimes deceives the patient, causing him to think that they are internal hæmorrhoids which pass inside of the bowel.

Symptoms.—In this variety the growth is of an insidious and slowly progressive nature. There is no pain, no sudden development or protrusion, and no obstruction to the functional action of the bowels. The majority of patients are rarely aware of their presence unless they become quite marked. It is only in the hypersensitive, overparticular, and nervous, who in the use of detergents become aware of an unnatural condition of the parts, that much attention is paid to them. The uneasiness which they produce is more mental than physical.

These piles do not conform to the folds of the rectum; they are not lobulated or easily outlined; they form a general swelling or cushion-like mass around the margin of the anus, and sometimes give one the impression of an inflated rubber pessary covered with skin and mucocutaneous tissue, with a bluish tinge that indicates the venous origin.

Treatment.—These hæmorrhoids, being brought about through habit and environment, are amenable to treatment by the regulation of those factors. As a rule they do not require any surgical operation. The patient should avoid prolonged sitting and straining at stool; the constipation which generally exists should be remedied before any attempt at treatment of the piles; tight, spasmodic sphincters should be gradually dilated, obstructive rectal valves, strictures, catarrhal diseases, and whatever causes constipation or obstipation should all be carefully treated and removed if possible. If there be none of these pathological conditions to account for them, their treatment may be based upon the lines

of dietary and physical regimen. In order to avoid the necessity of remaining long at stool the patient should be instructed to take an enema of about half a pint of cold water at some hour at which it is convenient for him to attend to the movement of his bowels regularly. As soon as he feels a strong inclination for this to come away, he should repair to the toilet, and without straining he will generally be relieved of whatever faecal matter is present in the rectum and sigmoid. He should be instructed not to sit at stool any longer than two or three minutes, after which he should go to his bed, lie down with his hips elevated, and apply cold cloths to the anus for five or ten minutes. Night is generally more convenient for men, but for women whose duties are at home, any hour may be selected in which they are least likely to be interrupted. The important thing is to have a regular time for this function, and to hold it inviolable. After a short, conscientious devotion to these regulations the bowels will soon become habituated to regular action, and frequently the movement occurs without the enema. At bedtime these patients should apply the following ointment:

℞ Ung. acidi tannice ʒiv;
 Ung. stramonii, }
 Ung. belladonnæ, } āā ʒj.
 M. et ft. ung.

Or,

℞ Ext. suprarenalis ʒij;
 Ung. lanolini ʒvj.
 M. et ft. ung.

The ointment should be spread thickly over a wad of cotton wool, and held in apposition with the parts by a T-bandage.

One should be warned against the use of drastic purgatives in this condition. They cause frequent stools and straining, and will aggravate rather than relieve it. The faecal movements should be kept soft but without purgation. A diet of meat, fruit, fresh vegetables, and Graham or whole wheat bread should be enjoined.

The patient should always lie down to make the cold applications, and should have his hips elevated above the level of the chest. Doing this in the squatting position accomplishes very little good. Outdoor exercise, walking, golf, tennis, and such diversions are very beneficial in these cases. Where there are no internal hæmorrhoids, and where the patient can be induced to carry out this regimen, the varicose external hæmorrhoids can generally be relieved in a period varying from three to six weeks. Where there are internal hæmorrhoids, however, and inflammatory conditions of the rectum which cause straining, irritating

discharges, and other symptoms, we can hardly expect this variety to be greatly benefited until those conditions have been relieved. If an operation for internal hæmorrhoids is thought necessary or desirable, one may at the same time remove a certain amount of the varicose veins which form this variety of piles, and cure them both at the same time. One should be careful, however, not to take away too much skin from around the margin of the anus lest a cicatricial stricture should follow.

The author has tried cauterizing these piles by a narrow-bladed Paquelin knife, and has been quite successful in the cases in which it was used; but the burning pain which follows this operation has caused him to discontinue it. Kelsey has advised the use of a fine needle-pointed cautery, by which he burns into the varicose veins at different points; this instrument has sometimes caused severe abscesses on account of the external opening closing before all the necrosed tissues in the deeper parts of the tract had been evacuated.

The treatment of these tumors by injection has been frequently advocated. It is performed as follows: After having thoroughly cleansed the parts with antiseptic solutions, the piles are made tense and protruding by the patient's straining and bearing down; the most prominent portions of the varicose mass are then injected at four or five points around the margin of the anus with a few drops of Shuford's solution (see p. 627), or some mixture of carbolic acid. As a rule, however, this treatment is not successful in any form of external hæmorrhoids.

Electrolysis has been recommended by a number of surgeons in the treatment of this variety of hæmorrhoids, but this method is not as effectual as the others detailed, and is only safe in the hands of an experienced electrician equipped with an apparatus by which the strength of the current can be absolutely measured. The ordinary office batteries are unreliable for such purposes. It has been suggested that the current be tested in the white of an egg, and used only sufficiently strong to coagulate this substance, but this is a very indefinite test. The positive pole is attached to a fine electrolysis needle which is introduced well into the substance of the tumor, and the negative pole applied to the buttocks. The swollen tissues may be first injected with a solution of cocaine if the patient is hypersensitive. There is some pain at the time of the operation which increases during the first twenty-four hours, and this is followed by considerable swelling and œdema of the parts; after this the swelling is said to subside and the varicosities rapidly disappear. After trying all these methods the author is convinced that the non-operative treatment is by far the most satisfactory.

Inflammatory External Hæmorrhoids.—This variety consists in an inflamed and swollen condition of the folds of the anus; they are also described under the name of œdematous piles. They are pear-shaped,

their small end extending sometimes within the external sphincter, and have a muco-cutaneous and cutaneous covering.

They originate in some traumatism or irritation of the margin of the anus. This may be mechanical or pathological. Anal or rectal ulceration, fissures, chancroids, improper detergent material, rough or too vigorous wiping, pæderasty, rectal masturbation, kicks, injuries, falls or strains may all produce them. Grasping of the upper portion of the tumors by the sphincter may cause considerable pain, but it never produces strangulation or sloughing, as in the case of internal hæmorrhoids when they become prolapsed. Sloughing may occur, but it is due to the inflammatory processes and not to strangulation by the sphincter, as their blood supply is outside of this muscle. Sometimes they originate in a traumatism which causes hæmorrhage and clot in the fold, and there is a combination of the thrombotic and inflammatory types. In such cases the color of the tumor will have a bluish tinge, especially when the skin is drawn down and made tight over the globular mass.

When it is of a purely inflammatory nature the tumor will be pear-shaped or elliptical, red, dense, swollen, and painful.

Symptoms.—They may be single or multiple, simple or complicated. The patient, if he does not recognize a positive injury to the parts, or has no history of previous rectal or anal affection, will generally notice at first a sense of heat, uneasiness, or itching. Upon examination he will feel at one or more points around the anus an increased prominence or a sort of oval swelling. The pain at first will be moderate, and when the inflammation is very mild it may pass rapidly away. Upon the next irritation, however, the swelling returns and the pain becomes aggravated. The parts ache and burn, there is spasm of the sphincter, and sitting down is painful. Lying upon the side, with the hips elevated, is the most comfortable position which can be assumed. Defecation is dreaded, and constipation therefore ensues. If the case be a severe one, constitutional symptoms will appear; the temperature may be elevated two or three degrees, the tongue coated, and the pulse rapid. Ocular examination of the parts will reveal one or more swellings of the shape already described about the margin of the anus, varying in size from that of a small hazelnut to a guinea-egg. They are not so hard as thrombotic hæmorrhoids, and sometimes give the sensation of fluctuation. They are always very painful to the touch, and if they be large, the mucous membrane will be dragged down from within the rectum, thus forming a part of their covering.

At the base of each tumor, or between two of them, there will often be found a small fissure, ulcer, or excoriation. Sometimes a pocket exists at this point, and in it may be found a hardened mass of fæces, a small seed, or other foreign body; a shallow, subtegumentary fistula may some-

times be found, the tract leading downward beneath the muco-cutaneous tissue. These hæmorrhoids may ulcerate and slough, or if the inflammation subsides, gradually shrink until they disappear or form connective-tissue piles; the latter is their usual course.

If the patient should be in a low physical condition and susceptible to infection, very grave constitutional symptoms may develop. As a rule they are the most painful of all hæmorrhoids, and one can hardly credit the amount of distress which may result from them.

Treatment.—The treatment of these consists in subduing the inflammation by antiphlogistic methods or in radical removal of the tumors. Lying with the hips elevated and an ice-bag applied to the parts, will often relieve them very quickly, but at the same time cold may cause sloughing. Where there is much œdema and swelling, gauze soaked in a 25-per-cent solution of boroglyceride should be applied, and a hot-water bag laid over this. As a rule this simple measure will reduce the inflammation and relieve the pain. The following ointment is also very effectual in this condition:

℞ Morphine sulph.	gr. v-x;
Ichthyol	ʒiv;
Ung. belladonnæ, {	
Ung. stramonii, }	.....āā ʒj.

Sig.: Apply two or three times a day.

Often the pain is so severe in these cases that patients are willing to submit to anything for relief, and operative measures are the surest way to obtain this. Some writers advise making an opportunity of the patient's exigency under these circumstances, and to persuade them to have an operation to which they are opposed by stating that it is the only certain means of cure. Such methods are distasteful. A fair, frank statement of what can be expected from both methods of treatment, and recommendation as to which is better in the individual case is a much more dignified and self-respecting position for the surgeon to take; he should not deign to frighten a patient into a course to which his candid advice does not persuade him. If the operation is decided upon, general anæsthesia should be employed, inasmuch as this variety is often associated with fissures, ulcerations, and internal hæmorrhoids, and stretching of the sphincter is very important. Occasionally, where only one fold is inflamed and the fissure is clearly in view, the hæmorrhoid may be removed and the fissure incised under cocaine anæsthesia. At any rate the sphincter should always be divulsed or incised in operations for this class of hæmorrhoids, otherwise a fissure will result.

The tumor itself should be removed by scissors or by crushing with the clamp. Neither the ligature nor the cautery should be used on the

skin tissue covering them, as they are both very painful. After excising the piles, the edges of the wounds may be sutured together, but it is doubtful if any particular advantage is obtained by this, as infection is nearly always present to prevent primary union. The only advantage of the operation over local treatment in these cases is the radical cure which is obtained. One method relieves the pain about as quickly as the other, but after the non-operative treatment there are left skin-tabs or connective-tissue piles which may reproduce the inflammatory variety at any time.

Connective-tissue Hæmorrhoids.—This variety of piles, called also cutaneous or fleshy piles and skin-tabs, consists in hypertrophy of the muco-cutaneous tissue about the margin of the anus. They appear when not inflamed as flat folds or tabs, more or less numerous, and sometimes entirely surrounding the aperture; the longest axis may run up and down or circularly around the anus, the base may be broad or constricted. They are generally composed entirely of muco-cutaneous tissue, with a stroma of connective tissue separating the two layers of the dermis in which run one or two arteries with their accompanying veins. The blood-vessels are more or less atrophied (Cripps) and there is an hypertrophy of all the elements of the muco-cutaneous tissues. Microscopic examination demonstrates, however, that the chief hypertrophy takes place in the subcutaneous connective tissues, and that the term "connective-tissue hæmorrhoids" is therefore more appropriate to the condition than any other. They may also contain cyst-like cavities, the remains of obliterated veins that give rise to a condition resembling cavernous tissue. Small mucous follicles and masses of fat may also be found in them.

They originate in three ways: they may result from an acute inflammatory hæmorrhoid in which the inflammation has subsided, leaving an hypertrophy of the connective tissue and of the skin, which tissues contract and obliterate to a greater or less degree the dilated veins; they may originate in some chronic irritation about the anus, such as fissure, mild ulceration, or catarrhal disease; they may follow thrombotic or varicose external hæmorrhoids. When they are developed from the latter they assume the circular type and extend entirely around the anus. It is not necessary for the production of this variety of disease that the exciting cause should be low down in the rectum. The condition, as has been seen, results from strictures, ulcers, and malignant diseases as high up as the sigmoid flexure. It has been claimed in such conditions that the connective-tissue hæmorrhoids are probably due to the irritating discharge of the original disease. The French authors claim that these skin-tabs, or "rhagades" as they call them, are indicative of syphilitic disease. When associated with

hard, inelastic stricture and ulceration of the rectum one may undoubtedly suspect this origin, but when not complicated by such a condition they are no more indicative of syphilis than of malignant or chronic inflammatory diseases of the rectum.

There are cases of this variety, however, in which there is no condition in the anus to account for them; they occur in lads fourteen and fifteen years of age, who have no recollection whatever of having had any anal or rectal disease, and are absolutely free from syphilis. It is possible that in these cases phimosis or sexual excitement may have caused the congestion or hyperæmia which produced them.

Symptoms.—Hæmorrhoids of this variety, when in their quiescent stage, can scarcely be said to produce any symptoms peculiar to themselves. They are not painful, they do not bleed, pressure will not cause them to disappear, they can not be kept inside of the sphincter, and they have no peculiar outline or color. They may be single or multiple, thick or thin, pedunculated or broad and flat at their bases. They are supplied by one, sometimes two small arteries; the number of veins varies according to the stage of development. They become inflamed by slight traumatisms, such as sitting upon a hard seat, horseback or bicycle riding, the passage of constipated stools, and too vigorous cleansing. Excessive eating or drinking, sudden exposure to cold after being overheated, and chafing in hot weather, will also excite inflammation in them. When this occurs the symptoms correspond to those of inflammatory piles.

Treatment.—Where these piles are uncomplicated by fissure, ulceration, or internal hæmorrhoids, they should not be molested unless they become inflamed or their presence annoys the patient mentally; if one finds it best to remove them, this can be done under cocaine by crushing them off with the hæmorrhoidal clamp. By this means the edges adhere, and being sealed by collodion and iodoform, they generally unite as if sutured.

Perfectly satisfactory results may be obtained by simply clipping off the hypertrophies with scissors and leaving the wounds to granulate. It is very important, however, to cut flush with the skin and leave no stump. When they are extensive, with broad bases, a more rapid cure may be obtained by cutting them off and suturing the edges of the wound together.

INTERNAL HÆMORRHOIDS.—While a great many varieties of internal hæmorrhoids have been described in literature, there are practically but four varieties. They may be classified as thrombotic internal hæmorrhoids, varicose internal hæmorrhoids, capillary internal hæmorrhoids, and mixed hæmorrhoids.

Hamilton (Clinical Lectures on Diseases of the Lower Bowel, p. 32)

describes a variety which he calls *columnar hæmorrhoids*, as follows: "The second variety, for which I would suggest the term columnar pile to denote its pathology, consists essentially in hypertrophy of the folds of mucous membrane surrounding the anal opening, the pillars of Glisson. They have a red, almost vermilion color, elongated form, and contain within them one of the descending circular branches of the superior hæmorrhoidal arteries."

Ball states that this is the most common variety of internal hæmorrhoids. According to his microscopic examinations they consist of inflammatory hypertrophies in which there are no varicosities. It appears, however, from the descriptions of these authors, that they refer either to inflammatory external hæmorrhoids or to simple inflammatory conditions of the rectal columns. Such conditions occasionally occur, but they can not be classified as true internal hæmorrhoids.

Thrombotic Internal Hæmorrhoids.—These consist in an extravasation and clotting of blood in the submucous tissues, and differ from external thrombotic hæmorrhoids only in the location and overlying tissues. They may occur in an otherwise healthy rectum, but generally complicate varicose piles.

They are less painful than external thrombotic piles, but sometimes produce an irritation and bearing-down in the rectum. To the touch they feel like small globular or elliptical tumors, movable beneath the mucous membrane and over the muscular wall. They present to the eye only a slight elevation, as the overlying tissues are never sufficiently distended for the blue color of the clot to show through it.

They are so rare, except in connection with internal varicose hæmorrhoids, that it is difficult to give any definite description of their course and final results. The writer has seen 2 cases in which the clot became encysted, and, when turned out of its capsule, appeared as an ovoid mass, hard, smooth, shining, and of a deep purple. They very rarely become infected or form abscesses. The treatment consists in evacuating the clot or removing the varicose mass in which they occur.

Varicose or Venous Internal Hæmorrhoids.—This is the most frequent variety of hæmorrhoids. It consists in a varicosity of the internal hæmorrhoidal veins with hypertrophy of the connective-tissue stroma in which these vessels lie.

They originate in the little venous pools which connect the arterial with the venous circulation. In the beginning they are simply congestions of the vessels. Pressure of the blood-column, straining at stool, the friction of fæcal passages, and other causes produce dilatation of the veins, hyperæmia of the parts, and hypertrophy of the connective tissue, until veritable angiomatous tumors are formed. These are ordinarily located at three points in the circumference of the

rectum: one upon each side and slightly in front of the posterior commissure, and one upon the right side and slightly behind the anterior commissure. Sometimes there is a fourth prominent one upon the left side of the anterior commissure (Plate IV, Fig. 2), but this is not ordinarily well developed.

Between these three prominent tumors there is generally a varicose condition of the veins, and sometimes small hæmorrhoidal tumors may develop. These, however, are of little importance from a surgical point of view, with the exception of one, which sometimes occurs immediately above the posterior commissure. Occasionally the whole circumference is involved in the varicose process, and the anus when it is dilated presents a veritable rosette of hæmorrhoidal tissue, only slightly more prominent in one portion than another. They begin abruptly at the ano-rectal line, and are covered entirely with mucous membrane. In their early stages, when quiescent, they lie dormant

and collapsed within the rectum, and can neither be seen nor felt unless the patient by bearing down protrudes them.

Except when inflamed and swollen their surface is irregular, lobulated, and crossed by numerous furrows running in different directions, produced by the attachments of connective-tissue stroma to the mucous membrane. When they have been prolapsed for some time or become inflamed these furrows practically disappear, and the tumors present a globular shape with smooth, shining surfaces (Plate IV, Fig. 3). When the disease has become chronic and the connective-tissue stroma hypertrophied, the tumors can then be brought into view by separating the folds of the

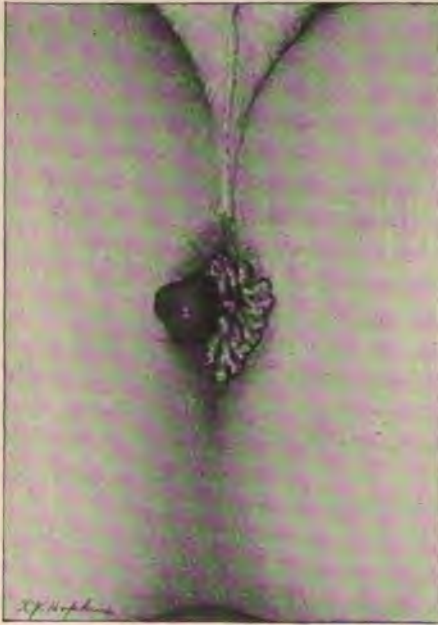


FIG. 193.—PROLAPSED INTERNAL HÆMORRHOID WITH CONDYLOMA ATTACHED.

buttocks and dragging down upon the margin of the anus, or they may be felt by the finger. If the tumors are habitually prolapsed the mucous covering may assume a muco-cutaneous character.

Their shape is variable; they may be globular or cone-shaped, and attached by a broad base; they may be pedunculated or semicircular,

involving almost the entire circumference of the rectum. Sometimes small polypi or condylomata are attached to them (Fig. 193). Their lower margin is sharply delineated by the white line of Hilton, and even where they are connected with external hæmorrhoids this line still marks the division between the two.

Pathology.—The tumors consist essentially of congeries of dilated blood-vessels and connective-tissue stroma. Upon section they present a sort of sponge-like or honeycomb appearance, due to the dilated veins and a few arteries held together by a complicated network of connective tissue in which are found epithelial and glandular cells. They resemble very much the erectile tissue found in the spongy body. In the cavities of the veins the section shows coagulated blood, thickening of the intima, and sometimes an inflammatory deposit in the blood-vessel walls, but generally these are thin and friable. The coagulation takes place after the hæmorrhoid is removed, and is not an essential part of its pathology. The arterial supply of the ordinary venous hæmorrhoid is not through one main branch, but through a number of arterial capillaries. Sometimes, however, one large artery runs into the tumor and can be felt pulsating when the finger is pressed above it. The tumors are connected with the muscular wall of the gut by very feeble adhesion, and can be peeled off both in life and post-mortem with the greatest ease, especially if the stripping be from above downward.

The muscles at this portion of the gut are supplied by the middle hæmorrhoidal arteries, and at two or three points around the circumference of the rectum there is a more intimate adhesion to the muscular wall, due to penetration by branches of these vessels. In the early stages the mucous covering is normal, but in old hæmorrhoids it is thickened, more dense in its composition, and the Lieberkühn follicles are very much atrophied, or may have disappeared entirely. Sometimes there are little areas of cicatrization indicating points at which there have been hæmorrhages or ulcerations. In the cases of general varicosity associated with diseases of the heart, liver, or spleen, the condition may occupy the whole length of the rectum and ascend even up into the colon, as has been described by Ludwig, Petit, and Valsalva.

The form of hæmorrhoids called "arterial" by Allingham, and described as being composed of congeries of arterial capillaries instead of veins, is not admitted by the majority of authors. This idea came from the fact that the blood sometimes comes in jets or spurts. This is explained by Cripps, as follows: "The jet is caused by blood being forced as a regurgitant stream through a small rupture in a vein by the powerful pressure of the abdominal muscles. If it really came from an artery, why did the jet only appear when the abdominal mus-

cles acted?" He holds that if the bleeding of an artery was the cause, straining and pressure would diminish rather than increase the spurting. In one instance of this kind he was able to discover a clot obstructing a small circular opening in the vein itself, and when this was removed to reproduce the spurting by causing the patient to strain with the abdominal muscles. His experience and the examination of many specimens of hæmorrhoids removed during life and post-mortem seem to justify his position; and, notwithstanding the authority of Van Buren, Brodie, and Allingham, the author is convinced that aside from the capillary variety there is no such condition as arterial hæmorrhoids.

Symptoms.—The two cardinal symptoms of internal hæmorrhoids are bleeding and protrusion; it is difficult to say which symptom is most frequently first observed. A slight oozing of blood very frequently occurs unobserved by the patient, and his attention is not called to this loss until he feels an unusual protrusion about the margin of the anus; when this is felt he generally examines his fæcal passages and the loss of blood is discovered.

In uncomplicated internal hæmorrhoids there is practically no pain and no obstruction to the passage of the fæcal mass. Bleeding may recur from time to time, especially in the lower classes, who do not watch themselves closely, and go on for long periods without its ever being suspected; whereas protrusion, as soon as it occurs, will be noticed and excite the anxiety of the patient.

In the varicose variety the hæmorrhage, while not so frequent as in the capillary, is sometimes excessive in quantity, resulting in dizziness and fainting; such cases, however, are exceptional. The patient generally observes a small amount of blood following a movement at stool. At first this loss occurs only occasionally, but after they have existed for some time and begin to prolapse, the hæmorrhages occur more frequently at stool, and may even come on at irregular periods from straining or physical exercise. The amount of blood lost at any particular time varies, and one must always take *cum grano salis* the description of patients as to the quantity or extent of any individual hæmorrhage.

In deciding upon the source of bleeding from the rectum, one must always bear in mind the fact that it may come from the stomach or from some portion of the upper intestine. Blood from the upper intestinal tract will be decomposed, dark, and tar-like in appearance; it will be mixed with the fæces and contain more or less mucus. That from hæmorrhoids is brighter in color, not mixed with fæces, but generally passes after the fæcal mass. When it first appears it may be of a dark, venous character, but if exposed to the air for a short

time it will become brighter in color by the absorption of oxygen. The fact that the blood is mixed with fæces and is clotted does not preclude the possibility of its coming from internal hæmorrhoids; there are patients who, from time to time, pass from the rectum large masses of clotted blood that undoubtedly came from internal hæmorrhoids developed high up on the upper margin of the internal sphincter. In all such cases the hæmorrhages cease after the hæmorrhoids are removed.

The protrusion of internal hæmorrhoids does not occur until after the tumors have developed considerable size. They at first come down only a very short distance and appear to the patient as an uncompleted stool, a sensation of something more to come away. As the condition develops, however, this increases, and the patient when straining at stool will feel at the margin of the anus one or more little masses, soft and velvety to the touch but without pain. In the beginning they recede spontaneously, but as they become larger and prolapse farther the grasp of the sphincter obstructs the return flow of blood in the tumors, they swell, the margin of the anus becomes œdematous (Plate IV, Fig. 3), and the patient finds it necessary to reduce them by firm pressure. In ordinary cases this reduction is a simple and easy process, but at times it is very difficult. Where there is great hypertrophy both of the vascular and connective tissue, the reduction is sometimes impossible to the patient himself, and it becomes necessary to obtain surgical assistance. In such cases rest in bed with the hips elevated and hot applications will sometimes result in spontaneous reduction.

Ordinarily there is no pain at the site of the tumors, but in well-developed cases there is a constant sensation of weight and aching in the sacral region. Sometimes there may be sharp lancinating pains around the margin of the anus when the hæmorrhoids are low down and within the grasp of the external sphincter.

When the tumors prolapse and there is strangulation by the sphincter muscles, the pain may become very severe. As a matter of fact, however, the longer the hæmorrhoids have existed and the greater the prolapse which accompanies them, the more relaxed and free from spasm will the sphincter become. Thus, strangulation in old cases of hæmorrhoids or in patients beyond middle life is rather a rare occurrence. It occurs more frequently in acute cases in which inflammation has developed and in patients of middle age.

Mucus is very generally present, either with the hæmorrhages or during their intermissions. Sometimes after bleeding has occurred periodically for a long time it ceases altogether, and is replaced by a constant or periodical discharge of mucus from the rectum; this is the condition which Richet has described as "white hæmorrhoids." Ball

appropriately says of this: "It is a singularly inappropriate term to designate what is nothing more than a catarrhal discharge resulting from continued irritation of the rectal mucous membrane."

Kelsey describes as one of the symptoms of hæmorrhoids a condition which he terms "rectophobia—the sense of impending evil, which is so common in rectal troubles." He says: "There is hardly any variety of pain or of functional nervous disease that I have not cured by the simple removal of hæmorrhoids, and this applies as often to men as to women." There is no doubt that hæmorrhoids and any other form of rectal irritation may produce profound impressions upon the nervous system. As has been described elsewhere in this book, delusions, hallucinations, and marked mental aberration are by no means infrequently the result of rectal disease. Such impressions, however, are more rarely produced by hæmorrhoids than by ulceration, stricture, and faecal impaction.

Among the symptoms of hæmorrhoids one should bear in mind the reflex disorders of the digestive organs, pain in the back and shooting down the legs, constipation due to the fear of having a movement lest a hæmorrhage be brought on, and anæmia consequent upon the loss of blood.

Capillary or Nævoid Hæmorrhoids.—In Hamilton's division this variety is described as a capillary nævus of the rectum. The facts that nævi are usually considered as congenital growths, and this type of hæmorrhoids is never found in children, render this term somewhat inapplicable. "Capillary" is more appropriate, inasmuch as it describes the anatomical condition. They consist in small, raspberry-like developments of the arterial capillaries close to the surface of the mucous membrane of the rectum. They are covered by a very thin layer of epithelium which is easily ruptured, and are the source of very frequent hæmorrhages.

They do not protrude, and can not be located by the most delicate touch; they constitute what is commonly known as "blind bleeding piles"; they bleed upon the slightest contact with an instrument or even from digital examination. The blood is of a bright-red arterial nature, and comes as a sort of oozing or dripping after each defecation. The amount lost at any one time is never very great, but the frequent recurrence soon depletes the system and brings on marked anæmia. In 1 case death was imminent from this cause when the pile was removed and the patient cured (Kelsey). Under the microscope they resemble the congenital capillary nævus, and from this the term "nævoid" has arisen.

When they have existed for some time the mucous membrane becomes thickened and the hæmorrhages cease, but the tumor continues

to grow, the venous and connective-tissue elements increasing more rapidly than the arterial, and eventually they resolve themselves into venous or varicose hæmorrhoids.

Pathology.—Macroscopically they present a soft, velvety, bright-red appearance much resembling a raspberry, are slightly elevated above the mucous surface, and covered with a thin layer of epithelial cells. Ball says that the change in the mucous membrane may occur, without any other manifestation of disease, in patches as big as a sixpenny piece.

Pressure with the finger will cause them to disappear for the moment, but immediately it is removed the tumor recurs. Ulceration does not result from the bleeding, and consequently there are no cicatrices as in the varicose variety. Under the microscope they present the appearance of a conglomeration of arterial capillaries cut transversely and at different angles. The veins are few and the connective-tissue stroma almost entirely absent. They are covered by a very thin mucous membrane; sometimes only a layer of striated epithelium separates them from the intestinal cavity.

Mixed Hæmorrhoids.—In cases where internal and external hæmorrhoids exist together, the division between the two is clearly demarcated by the so-called "white line" of Hilton, or sulcus, which marks the attachment of the external sphincter to the lower end of the gut.

The connective tissue is denser at this point than elsewhere around the rectum, the mucous membrane is more closely adherent to the muscular walls, and the vascular supply is most limited. It is only after internal hæmorrhoids have existed for some time, and through their gradual growth and downward pressure have raised the membrane from its close attachment to the muscle and dilated the latter, that the piles cover this line. When they have once passed it, free anastomosis with the veins below occurs, and we have what is called externo-internal or mixed hæmorrhoids. They are covered by both mucous and muco-cutaneous tissue (Fig. 194), and are composed of varicosities of the



FIG. 194.—MIXED HÆMORRHOID.

internal and external hæmorrhoidal veins; they are of a pale opaque pink in their lower portions and bright red or purple in the upper. They are smooth and globular in form below and lobular or grooved above like varicose hæmorrhoids. They never entirely recede into the rectum, inasmuch as part of them belongs outside. Their symptoms, pathology, and treatment comprise those of external and internal hæmorrhoids combined.

TREATMENT OF INTERNAL HÆMORRHOIDS.—The treatment of internal hæmorrhoids may be classified as preventive, palliative, and curative.

Preventive.—The presence of predisposing causes may be recognized frequently before the actual development of hæmorrhoids, and it is the part of the family physician to warn his patients of them. The influence of heredity is very problematical, but the habits, environments, and avocations of families are inherited, and they cause hæmorrhoids.

Constipation in children should always be looked upon seriously and its causes removed. Dilatation of the sphincter will often accomplish wonders in this respect. Cold enemata, soap bougies, and glycerin suppositories are all superior to the use of laxatives at this age. At puberty and middle age, individuals with a hæmorrhoidal tendency should avoid indiscretions in diet such as would cause congestion of the liver, constipation, and indigestion.

The avoidance of predisposing and exciting causes, such as sitting long at stool, great muscular strain, excessive venery, improper diet and drink, will do much to prevent the disease. A meat or nitrogenous diet is the most effective in such cases. Wines, liquors, and the excessive use of tobacco should be discountenanced.

The bowels should be regulated, but not by drastic or irritating cathartics; small cold enemata at regular periods is very effectual for this purpose, and they also tend to reduce any congestion in the lower end of the rectum. Cascara combined with malt is one of the best laxatives in such conditions, and should be administered in doses ranging from a dram to an ounce at bedtime, according to the patient's needs. Phosphate of soda is also an excellent remedy. The passage of a medium-sized bougie to gently dilate the sphincter and at the same time stimulate peristaltic action will often do much to prevent the disease. This should not be done too frequently, and the instrument should not be too large lest it should set up irritation and bring on inflammation. Once in twenty-four or forty-eight hours is sufficient. Such diseases as proctitis, hepatitis, uterine displacements, stricture of the urethra, and stone in the bladder should be remedied, both on account of their effects and to obviate the hæmorrhoidal develop-

ment. If the rectum is dry and the fæcal masses hard, injections of sweet-oil, or glycerin, or liquid vaseline will prove of the greatest benefit. Even where the hæmorrhoids have already begun, these simple measures directed toward the rectum itself, and the avoidance of habits and conditions which predispose to and excite the hæmorrhoidal disease, will in many instances abort the attack and prevent its future development.

Palliative Treatment.—Any resort to tentative or palliative measures in conditions which may be radically cured by operations, little if at all dangerous, is not considered conservative surgery to-day. There are many patients, however, in whom radical measures are out of the question on account of complicating circumstances and diseases. Physical and nervous conditions, business and social arrangements, and sometimes the absolute lack of moral courage, frequently render it impossible or unadvisable to operate for hæmorrhoids. Some hold that the palliation of hæmorrhoids is unscientific and only done from sordid motives; that radical removal is the only method of treatment. Aside from the fact that operation is often contraindicated, the patient himself has some right to choose whether he will be operated on or treated by palliative means for conditions in which life is not endangered. It is true that hæmorrhoids are likely to recur after palliative treatment, but it is also true that many patients treated by these methods go for years without any recurrence, and some never have it. The fact that the large majority of those who suffer from rectal diseases in the United States to-day are treated by irregular practitioners is due to the inability or refusal of the general surgeon to apply palliative measures properly.

If the disease were a malignant one, or one likely to endanger the life or usefulness of the individual, such refusals would be justified; but this is not the case. Men and women go through life, live to a good old age, and die from some other disease, carrying with them from adolescence a bunch of hæmorrhoids that become aggravated from time to time, bleed and prolapse, and yet never disable them for more than short periods. Where the hæmorrhage is excessive and frequently repeated, and as a result the patient is weak, debilitated, and threatened with profound anæmia, a radical operation is demanded, and one may be justified under these circumstances in refusing to take the responsibility of doing anything else than radically and rapidly putting an end to this exhaustive drain upon the system. But in ordinary cases of simple, varicose, internal hæmorrhoids, bleeding occasionally, prolapsing to a slight degree, and causing their victims nothing more than an uneasiness and slight discomfort, the palliative method is not only justifiable but frequently the most advisable. No operative

method is without some immediate or remote danger; therefore, while a patient may be told that there is practically no danger to his life, there is always the possibility of results which are altogether undesirable. Of course such results are very improbable, but they do occur, and patients hearing of them become unalterably opposed to operative treatment. With nervous patients such a conviction is a contraindication to operative procedures, and the radical methods have been frequently brought into disrepute by being forced upon such individuals who suffer from imaginary disabilities and discomfort in the rectum forever afterward. In cases, therefore, with these exaggerated fears and antipathies toward operative procedure, it is better to adopt the palliating methods, explaining thoroughly that they are not radical cures, but that by repetition they will give relief and maintain comparative comfort as long as they are continued.

The cardinal principles in the palliative treatment of hæmorrhoids consist in the prevention of prolapse and arrest of hæmorrhage. The hæmorrhage is always the most alarming symptom to the patient, and as it may be excessive it should be considered first. It is rarely difficult to stop the flow; rest in the horizontal position, cold applications, injections of hydrastis, tannic acid and krameria, and pressure upon the anus will usually accomplish this. The chief object is to prevent its recurrence. In the first place, obstructions to the portal circulation should be remedied at once, whether they be in the line of the vessels or in the liver itself. The diet should be regulated as to quality and quantity. Less food and more exercise is usually good advice in these cases, but there are exceptions to this rule. Restriction in the use of carbohydrates and alcohol is always necessary. If the patient has been in the habit of taking a large quantity of liquor, and it is impossible or unadvisable to cut it off altogether, a small glass of sherry or a little Scotch or rye whisky two or three times a day may be allowed. Coffee and tea should be taken in great moderation, and the use of tobacco should be limited.

He should also be directed to take regular and prolonged exercise in the open air. If the hæmorrhoids do not prolapse so that they would be irritated by horseback-riding, it is one of the best forms of exercise for stout individuals. Sometimes, however, the separation of the buttocks in order to straddle a horse, and the strain of rising and falling in the stirrups, induces prolapse of the tumors. Under such circumstances riding is harmful, and should be supplanted by walking and moderate indulgence in outdoor athletics. Late hours and exhausting cares, either of a business or social nature, should be avoided. A regular time for going to bed and rising should be adopted, but too much sleep and rest in bed are not conducive to the best feeling of such

patients. Eight hours is as much sleep as most healthy individuals need, and rising at a moderate hour after this amount of rest, together with a cool bath and a good rub, is much more conducive to good feeling and general functional activity than lying in bed covered and overheated for nine or ten hours. The regulation of the bowels is of great importance; the fæcal masses should be kept soft and unirritating, and abdominal straining at stool prevented. A certain amount of laxative medicine is necessary in the treatment of all these cases, especially in the beginning. Some remedy which will produce a soft, consistent stool is therefore better than cholagogues or saline purgatives. The following combination is excellent:

℞ Ext. colocynth comp., }āā gr. xij;
 Ext. cascariæ, }
 Ext. belladonnæ, }āā gr. iij.
 Ext. nux vomicæ, }
 M. Ft. pil. No. xii.
 Sig.: One or two at bedtime.

Cascara given as heretofore advised is very satisfactory. Aloin, gamboge, and the resinous cathartics are often harmful in this condition, but occasionally a combination of calomel, bicarbonate of soda, and podophyllin in small doses two or three times a day for a week will act like magic. Phosphate of soda or small doses of Rochelle salts in hot water before breakfast are also very effectual at times. Cold-water enemas are often more satisfactory than drugs. Any preparation which produces straining and prolonged sitting at stool should be at once discontinued. After the bowels have moved the parts should be gently cleansed with cold water and a soft sponge, but never wiped vigorously with rough or irritating detergent material, especially newspaper, as printers' ink is very deleterious in this condition.

If the hæmorrhoids prolapse and spontaneously recede, great benefit may be derived from lying down and injecting a small quantity of cold, even ice-water, into the rectum immediately after the movement of the bowels, and retaining it as long as possible. If, however, they have to be replaced, it is a good plan to cleanse them as above advised, and before reducing apply some astringent ointment or solution. The following formula of the late Dr. Cathcart, of Philadelphia, is excellent for this purpose:

℞ Ung. acid. tannici ʒiv;
 Ung. stramonii, }āā ʒj.
 Ung. belladonnæ, }
 M. Ft. unguentum.

This ointment, applied freely at the time of stool and upon going to bed at night, will not only check moderate hæmorrhages but subdue the active inflammation in the hæmorrhoids. Even where hæmorrhoids are inflamed and partially strangulated by inflammation, its application will frequently subdue the condition to such an extent within a few hours that the patient will rarely consider the question of operation when he realizes the relief obtainable from such methods of



FIG. 195.—HARD-RUBBER PILE-PIPE.

treatment. Where the hæmorrhoids do not protrude, the application of the ointment may be made through a hard-rubber pile-pipe (Fig. 195).

Another ointment which is popular in the markets, and said to be of great value in the treatment of hæmorrhoids, is the following:

℞ Sulph. morphiæ	gr. 1½;
Tannin	gr. 24;
Pine-tree tar	gr. 36;
Wax	gr. 36;
Benzoated lard	gr. 383.

Fluid extract of wich-hazel is also a useful remedy in internal hæmorrhoids. For immediate control of hæmorrhage most authors recommend the application of persulphate or perchloride of iron; it produces a clot which is very hard and irritating to the mucous membrane, and is frequently followed by a secondary hæmorrhage when this comes away. The reduction of the hæmorrhoidal mass and the injection of cold water, or the application to the tumor of a pledget of cotton thoroughly infiltrated with iodoform or suprarenal extract, will check the hæmorrhage quite as well and does not leave any uncomfortable after-effects. The latter promises to become the most reliable remedy for this purpose. Where the hæmorrhoids do not protrude it may be used in suppositories as follows:

℞ Ext. suprarenalis	gr. x;
Ol. theobromæ	gr. xl.

These can be applied immediately after stool and upon going to bed; they produce no irritation of the mucous membrane and no uncomfortable effects whatever. In cases where there is excoriation or ulcera-

tion of the hæmorrhoidal tumor, powders such as bismuth, calomel, oxide of zinc, and aristol serve the double purpose of checking hæmorrhage and healing the parts.

Suppositories are sometimes a convenient method to apply drugs to hæmorrhoids, but they frequently slip up beyond the diseased area and do no good. Recently some have been put upon the market so shaped that they remain in the hæmorrhoidal area until they are dissolved. Iodoform in quantities of 5 to 10 grains in each suppository sometimes gives much relief.

Ichthyol in combination with other drugs is an excellent remedy. The following formula is very effective:

R	Ichthyol,	}	..... āā gr. v;
	Tannic acid,		
	Ext. belladonnæ,	}	..... āā gr. ½;
	Ext. stramonii,		
	Ext. hamamelis			..... gr. x.

M. Ft. suppository.

Opium in any form is rarely useful in the treatment of hæmorrhoids because it causes constipation. The hypodermic use of morphine is admissible where the pain is very great and where spasm of the sphincter is annoying. This spasm of the sphincter is a matter of considerable importance in the palliative treatment of hæmorrhoids. The occasional passage of a full-sized rectal bougie, which is allowed to remain within the grasp of the sphincter for five or ten minutes, usually overcomes the spasm, but occasionally it is necessary to administer nitrous oxide or ethyl chloride and divulse the muscle. Patients submit to this who will not consider other operations at all, and it sometimes results in radical cure.

The amount of relief that can be obtained and the number of cases which can be practically cured through these palliative methods are not appreciated by surgeons and practitioners in general. Thousands of patients who have hæmorrhoidal disease are yearly consulting irregular practitioners and quacks for non-operative treatment of these conditions. It is useless to say that these "pile doctors" do not cure anybody. In a given number of cases their methods would not be as uniformly successful as operative measures; nevertheless, they would succeed in relieving the large majority and in practically curing many of them. It is wise, therefore, not to force an operation upon unwilling patients, but to give them the benefit of whatever knowledge is possessed of this line of treatment. Frequently, if they have been relieved in several attacks of hæmorrhoids by palliative measures only to have recurrences, it will be possible to overcome their prejudices

and persuade them to have radical operations done, although they at first absolutely refused to do so.

Operative Treatment of Hæmorrhoids.—Of the many operations devised for the cure of internal hæmorrhoids only a few need be described at the present day. They are all based upon one of two principles, viz., the atrophy of the tumors by shutting off their blood supply, or their radical removal by surgical operations. The principal methods of accomplishing these ends are gradual or forcible dilatation of the sphincter, cauterization, injection, the ligature, clamp and cautery, crushing, excision.

Dilatation.—In the foregoing pages we have already referred to the beneficial effects of gradual dilatation in the treatment of minor degrees of hæmorrhoids. Verneuil was the first advocate of this method, and in 1871 published an article in which he claimed that the use of cold water, and either gradual or rapid dilatation of the sphincter muscles, were the best methods for the cure of this disease. The fact that acute internal hæmorrhoids existing in women during pregnancy are often relieved or cured by dilatation of the sphincter at the time of delivery, is well known; but it is impossible to understand how this operation can accomplish any good in old cases which prolapse at stool or upon the slightest provocation, and in which the muscles are already too relaxed to retain the parts in their normal position. Further dilatation in such cases would only aggravate the condition. In this class of cases it is not only necessary to get rid of the tumors, but also to restore the tone of the sphincter muscles.

On the other hand, there are mild cases of the disease in which the small tumors prolapse at stool and are grasped by the external sphincter, thus causing much pain and annoyance. In these, divulsion often relieves the symptoms, and if it is followed by cold injections and proper regimen, it will result in a radical cure. Dilatation can be easily performed under the influence of nitrous oxide gas or ethyl chloride; the operation does not disable the patient in the least, and may be done in the doctor's office without any fear of bad results. The permanency of cure by this method depends largely upon the faithfulness with which the cold enemata and dietary regimen are carried out afterward.

Method of Dilatation.—Inasmuch as dilatation of the sphincter forms an integral part of all radical operations for hæmorrhoidal disease, it seems worth while to give the subject a somewhat detailed description. Numerous instruments and methods have been devised by different operators to accomplish this purpose; most of them are practically divulsors, but they may be used as dilators instead. The principle which underlies all true benefit from dilatation consists in the fact that the muscles are not torn but simply overstretched till all spasm is overcome. Where

the dilatation is carried on too rapidly, the mucous membrane is torn and the muscular fibers are separated at the anterior and posterior commissures. When this takes place the muscles themselves are only partially stretched and soon resume their spasmodic condition, which is only exaggerated by the fissure-like cleft which is made in the mucous membrane. If, however, the dilatation is gently and slowly carried out the muscles may be stretched and temporarily paralyzed without any tear of the mucous membrane, except in cases where fissures or ulceration already exist, and the results will be much more permanent in the relief of the spasm. Kelly's anal dilator (Fig. 68, *d*) is a useful instrument for the accomplishment of this purpose. It is supplied with a register which gives the operator a full knowledge of the amount of dilatation accomplished; it should be introduced with a boring motion, being withdrawn occasionally for the operator to test by digital touch the amount of relaxation accomplished in the muscles. Four or five minutes should be occupied in this method of dilatation, and, speaking in general terms, it should be carried out until four fingers can be easily introduced through the anus and into the ampulla of the rectum. By it all parts of the anus are distended equably, and little danger of rupture exists.

Another instrument which is highly recommended for this purpose is Mathews's rectal divulsor (Fig. 196). The skilful hand, however, is better than any instrument for this purpose. There are two principal



FIG. 196.—MATHEWS'S RECTAL DIVULSOR.

methods in vogue for manual dilatation of the sphincters: in the first the two thumbs are introduced through the anus and slowly but firmly separated from before backward and then from side to side, practising massage upon the resisting muscles until a flabby, pulp-like condition is produced. The time occupied by this procedure will differ according to the development and spasm of the muscles; in some cases it can be easily done in two minutes and with very little force; in others, it requires five to six minutes and all the strength that the operator possesses in his thumbs. The tendency is always toward too great haste. If carefully performed, it can be done without rupturing the mucous membrane or causing bleeding, but there will always follow it a certain amount of extravasation of blood in the cellular tissue around the anus. The habit of putting the thumbs in the rectum and the fingers of one hand upon the pubis and those of the other upon the sacrum, or upon

the tuber ischii, and stretching or tearing the rectum in ten or fifteen seconds to the desired extent, is unsurgical and often disastrous; deliberation and patience in the performance of this operation can not be insisted upon too strongly. One should also be careful in stretching the rectum from before backward not to press upon the prostate or crush the urethra against the pubis, thus producing traumatism of these organs; sometimes irritation of the neck of the bladder and deep urethra, together with more or less bleeding from the urethra, follow violent dilatation of the rectum in this direction. The second method of dilatation consists in introducing one finger after another into the anus until all four can be insinuated through the two sphincters; this is done with a boring motion, and finally the body of the hand can be inserted. With the fingers and palm of the hand passed through the sphincter muscle, the former are then doubled up, as in closing one's fist, and further dilatation thus occurs through the expansion of the circumference of the hand. Care should be taken that the finger-nails are always short and clipped round, so that cutting or scratching of the mucous membrane will be avoided. The same time and deliberation should be exercised in this method as in those previously described. This method of dilatation is that employed in Simon's operation of introducing the hand into the rectum for the purposes of examination. If equal care and deliberation are exercised, one of these methods is just as good as the other.

Before attempting any operation, or allowing the patient to come out from under the influence of the anæsthetic, the operator should remove the dilating instrument or his hand for two or three minutes, to observe whether or not there is a tendency in the muscle to recontract. In case such a condition exists, he should carry the dilatation farther and retain the dilating instrument or hand for a longer time. Thorough relaxation having been accomplished, one may proceed with whatever operation is necessary. If dilatation is all that is intended, a suppository containing opium 1 grain and extract of belladonna $\frac{1}{2}$ grain should be introduced, and a compress of soft cotton wool applied to the anus.

Most operators advise confining the patient for two or three days after this operation. Unless there be some hæmorrhage or other reason calling for this, it is unnecessary.

The use of cocaine, either hypodermically or locally, for stretching the sphincter has not proved satisfactory in my hands; the amount of the drug necessary, the frequent punctures of the needle and consequent irritation and œdema of the parts, are all objectionable. Reclus and Bodine have each reported satisfactory results from the injection of large quantities of a mild solution of the drug for this purpose, but in general one will find some form of complete anæsthesia much more satisfactory.

Treatment by Cauterization.—Cusack and Houston (Dublin Jour. of Med. Sci., 1843, p. 95) many years ago enthusiastically advocated the use of nitric acid in the treatment of hæmorrhoids. This and various other cauteries have been from time to time exploited as cures for this disease. The method is very useful in the capillary variety of piles but it has become obsolete in all others.

In capillary hæmorrhoids, the application of nitric acid is one of the safest and most effective means of treatment. In these cases a conical speculum (Fig. 63) is introduced, and the slide is drawn out until the little pile protrudes into the fenestrum; it should be wiped off dry with absorbent cotton, and the acid applied all over its surface by means of a wood or glass applicator. Some have advised the use of little spun-glass brushes for the application of the acid, but, as Ball points out, there is danger of small fragments of glass breaking off from these brushes and penetrating or irritating the mucous membrane. The speculum should be held in place for four or five minutes until the acid has thoroughly attacked the tumor, and then the parts should be washed off with a saturated solution of bicarbonate of soda in order to remove any excess of acid which may remain. The first application of the acid generally checks the bleeding effectually, but in order to eradicate the tumor it is necessary to repeat the application two or three times at intervals of about five days or a week.

There is no necessity for cocaine or any other local anæsthetic in this method, as it produces no pain in the mucous membrane; but great care is necessary to avoid touching the margin of the anus with the acid. That region should be smeared with vaseline before the application is attempted. After the speculum is withdrawn, a suppository containing $\frac{1}{2}$ a grain of opium is advisable to overcome tenesmus and peristaltic action.

Other chemicals have been employed for this purpose, such as nitrate of silver, caustic potash, arsenical paste, acid nitrate of mercury, pyrogallie acid, and butter of antimony, but none of these is as effectual as the fuming nitric acid.

Hamilton (Ball, *op. cit.*, p. 255) recommends passing through the tumor needles coated with fused nitrate of silver. A better method than any of these, however, consists in the application of the electro-cautery. The tumor is brought into view just as for the application of nitric acid, and a 10-per-cent solution of cocaine applied as a precaution more than a necessity. After two or three minutes a small, flat electro-cautery is applied to the summit of the tumor and the current turned on; by this the whole growth can be burned away at one sitting; the hæmorrhage is immediately checked and does not recur, and afterward an opium suppository is introduced and the patient is allowed to go about his occupa-

tion after two or three hours' rest. This procedure has the advantages of being aseptic, radical, and exact, in that one can govern absolutely the area and depth to which the cautery burns, and a second application is rarely necessary. The method is also applicable to small venous piles high up in the rectum.

Electrolysis.—For the class of tumors which have just been mentioned, Ball recommends electrolysis. His method is as follows:

“The pile being brought into view, the surface is well painted over with a solution of cocaine hydrochlorate (4 per cent), and after the lapse of five or ten minutes four or five round sewing-needles mounted in a handle are passed into the center of the tumor and connected with the negative pole of the battery, 10 to 20 Leclanche elements being the most suitable; the other (positive) pole being applied by means of a wet sponge to the buttock. After a few minutes the surface of the pile will be seen to become white, and minute bubbles of hydrogen gas will be seen escaping round the needles. As soon as this is well marked, the needles are withdrawn, and if deemed necessary, reintroduced into another part of the same or another pile. In a few days the piles shrivel up and disappear painlessly. If the positive pole is used the needles stick tightly in, and hæmorrhage may result from their forcible withdrawal. It has, however, in order to avoid this inconvenience, been recommended in the case of nævi to use the positive pole first attached to the needles, and then, after a few minutes, to reverse the current for a short time previous to the withdrawal of the needles. I have not, however, found this plan satisfactory, and prefer to use the negative pole all through.” It requires one or two applications to complete the cure, it does not confine the patient, and with the use of cocaine there is comparatively no pain. This method is more difficult than electro-cauterization, and the results are not quite so radical. The one advantage which it has over the other method is that no ulceration is produced by it, and the patient is never annoyed by the slight moisture and occasional backache which is associated with all operations which depend upon healing by granulation.

Injection Method.—The injection treatment of hæmorrhoids is said by Andrews (Rectal and Anal Surgery, p. 34) to have originated with Mitchell, of Clinton, Ill., in 1871. The method was kept secret and rights to practise it in certain districts were sold to drug clerks, farmers, irregular practitioners, or to any one who had the money to pay for them. It soon fell into the hands of uneducated and irresponsible charlatans who traveled from town to town, recklessly performing the operation upon all kinds of cases, sometimes injecting polypi and even carcinomata for piles. Andrews's statistics upon this method were gathered from the work of this class of practitioners, and the great wonder is, not that he found many bad results, but that they

were so few. He collected 3,304 cases (*loc. cit.*, p. 36) with the following results:

Deaths.....	13	Stricture of the rectum.....	2
Embolism of liver.....	8	Violent pain.....	83
Sudden and dangerous prostration...	1	Carbolic-acid poisoning.....	1
Abscess of liver.....	1	Failed to cure.....	19
Dangerous hæmorrhage.....	10	Severe inflammation.....	10
Permanent impotence.....	1	Sloughing and other accidents.....	35

The records are not sufficiently complete for analysis, but it is safe to say that they show remarkably good results obtained by the method under adverse circumstances. Any other surgical operation for hæmorrhoids in such inexperienced and unscientific hands would have produced a larger mortality and a longer list of accidents. The mortality of less than one-half of 1 per cent, and failures in about one-half of 1 per cent, are certainly not alarming results. Can any practitioner cite 3,300 cases of hæmorrhoids operated by any other method with only 2 strictures? The other accidents, embolism and abscess of the liver, prostration, permanent impotence, carbolic-acid poisoning, severe inflammation and sloughing, are too indefinite and problematic in their etiology to merit a discussion. It is possible some of them were produced by the injection, but certain that most of them were not. These statistics, however, and the abandonment of the method by Kelsey—who, having had over two hundred perfectly satisfactory results, suddenly turned against the operation after one or two accidents—created at one time a strong prejudice against it. Lately, however, a better knowledge of the method and the class of cases to which it is applicable have led many surgeons to give it a trial, and their reports are very satisfactory. The method is well worthy of thorough consideration.

The Class of Hæmorrhoids in which Injection may be Used.—The most enthusiastic advocates of this method no longer advise it in any other than internal piles. Even Agnew, in the last edition of his book, says: "Since the advantages of cocaine have become known, and the fear of hæmorrhage has been dispelled, there is absolutely no apology for the treatment of external hæmorrhoids by any method other than excision" (*loc. cit.*, p. 24). This is the position taken by the writer in a paper before the Academy of Medicine in 1894, and is almost universally accepted. Only those piles should be injected which can be brought into view and made surgically clean; occasionally small tumors may be treated through the conical fenestrated speculum, but it is not so satisfactory as when they are brought outside of the anus.

The size of the hæmorrhoids is no contraindication to this method of treatment so long as they completely collapse when pushed up in

the rectum. Some claim that it is a matter of indifference whether the hæmorrhoid is already ulcerating or not, but the author does not consider it wise to inject under these circumstances. Mixed hæmorrhoids and those complicated by fissure or spasmodic sphincter are not favorable for the injection treatment. In a word, uncomplicated, varicose, internal hæmorrhoids are the ones to which this method is most applicable.

There are two distinct schools in the injection treatment: the first injects strong solutions in large quantities, thus causing a sloughing of the entire hæmorrhoidal tumor; the second injects small quantities of weak or moderately strong solutions, and in this way produces an inflammatory induration and choking of the circulation, which is followed by shrinking and atrophy of the piles without ulceration or sloughing.

Agnew, of San Francisco, represents the first school. He claims that all the accidents following treatment by injection are due to the use of mild solutions, which he says set up an inflammatory condition with minute thrombi in the veins that are easily dislodged. He states that the injection of strong solutions of carbolic acid in quantities sufficient to permeate the entire substance of the tumor acts as an escharotic, causing immediate death of the hæmorrhoidal mass, and this drops away as a dry eschar in a few days. He lays great stress upon the mixture used, which he prepares as follows:

"The solution of carbolic acid found to be uniformly successful in the treatment of hæmorrhoids by injection is prepared by first making a solution of the acetate of lead and borax in glycerin, in the proportion of 2 drams each of the chemically pure salts to 1 ounce of Price's glycerin.

℞ Plumbi acet.,	}	.....āā 5ij;
Sodii bibor.,		
Glycerinæ		..... 5j.

"Mix in a graduate, pour into a 2-ounce vial, and let stand for twenty-four hours. The solution of the salts is hastened by placing the vial in a warm-water bath and letting it remain there for fifteen or twenty minutes. The glycerin can be handled to better advantage and its measurement more accurately made by warming it before it has been poured into the graduate and the chemicals have been added.

"Select Calvert's No. 1 crystallized carbolic acid and pour a sufficient quantity, liquefied by warmth, into a 2-ounce graduate to measure 1 ounce, and add 2 drams of distilled water. To this add enough of the glyceride of lead and borax previously made to make the combination measure exactly 2 ounces.

℞ Acidi carbol. cryst.	℥j;
Aquæ destillati	℥ij;
Sod. bibor. et plumb. glyc.	℥vj.

Misce et Sig.: Solution for hæmorrhoids.

"The object of the water in the formula is to lessen the sirup-like consistence of the preparation. Should equal parts of crystallized carbolic acid and glyceride of lead and borax be combined, the solution will be found rather too heavy for convenience. It will not flow through the hæmorrhoidal needle as freely nor take hold of the tissues, when injected, as quickly as does a solution containing a small proportion of water."

Others of this school use mixtures of carbolic acid with olive-oil, or other substances, and vary the strength from 25 to 75 per cent.

The famous Brinkerhoff method consists in injecting hæmorrhoids with the following mixture:

℞ Ac. carbolicæ	℥j;
Ol. olivæ	℥v;
Zinci chlorid.	gr. viij.

From two to eight minims are injected according to the size of the pile.

Carbolic acid is the principal ingredient in them all, and the intention is to destroy the hæmorrhoid by causing it to slough off. This necessarily leaves an ulceration of the rectum which may give more distress than the piles, especially if the sphincter is not dilated and perfect drainage afforded. To avoid any misunderstanding, the author would state that he has no sympathy with this method. If the treatment of hæmorrhoids by injection is to be followed by sloughing, ulceration, and granulation, and the patient is to be confined to his bed for a week or more, then all its supposed advantages disappear. An ulcer produced by diffuse cauterization and sloughing is never as healthy or prompt in healing as a clean surgical wound, and can not be so accurately limited to the diseased tissue. The pain during the period of sloughing is greater than that following surgical operations, and the dangers of abscess or sepsis by absorption from the necrotic area are incomparably more. The patient escapes general anæsthesia, but at the expense of time, pain, uncertainty, and danger. If, therefore, the hæmorrhoid is to be removed, let it be done by scientific surgical methods. If, however, the hæmorrhoids can be eradicated without pain, sloughing, ulceration, or confinement, it will be a distinct improvement over operative measures; this is what is claimed for the second method of injection, and in properly selected cases it is believed that the claim can be substantiated. The principle upon which this method

is based consists in the production of an inflammatory induration of the hæmorrhoidal mass through which the circulation is retarded or partially cut off, but which does not go to the extent of cauterization or strangulation so as to result in sloughing. The cases to which it is applicable are those of uncomplicated internal hæmorrhoids which can be brought into view and sterilized, in which no ulceration and no external hæmorrhoids exist, and in which the sphincters are comparatively relaxed.

The Operation.—The patient should be just as carefully prepared for injection as for any other operation for hæmorrhoids. The sphincter should be gradually and gently dilated, a procedure that may require two or three days if it is spasmodic. The bowels should be carefully emptied the night before the injection by a laxative, and a saline enema should be given one hour previous to the treatment. If it is difficult to bring the hæmorrhoids into view, the patient should sit upon a vessel filled with hot water and strain for a few moments in order to bring the tumors down; when this is accomplished he is laid upon the side to which the hæmorrhoids to be injected are attached. While he pulls upward with one hand upon the upper buttock, an assistant pulls downward on the lower one, and thus the tumors are steadied and kept outside of the anus. They are then thoroughly but gently washed with soap and 1-to-2,000 bichloride solution, after which they are dried and the injection is made. The needle is introduced at the juncture of the tumor with the normal mucous membrane below, and carried well across its base. The finger is then introduced into the anus to ascertain that the needle has not penetrated or closely approached the mucous membrane above. Small amounts of the fluid are then slowly injected, partially withdrawing the needle and reintroducing it in different directions so as to distribute the fluid as equally as possible over all the base; after this the needle is carried upward into the body of the tumor and a small quantity of fluid is injected near its center. The needle is then left *in situ* for one or two minutes in order that the fluid may become disseminated and not flow out through the point of puncture. A small pledget of cotton soaked in alcohol is placed around the needle so as to cover the puncture when it is withdrawn and to prevent the fluid which may escape from irritating the surrounding tissues. The tumor is kept outside of the sphincter for two or three minutes in order that the squeezing necessary to reduce it will not force the fluid into other portions than those into which it was injected; it is then reduced, a small compress of cotton is placed upon the anus and held there firmly by a T-bandage, the patient being required to lie still for ten or fifteen minutes. It is best to keep him quiet for a few hours after the first injection, because the inflammatory action produced in one patient is never any guide as

to what will be produced by the same injection in another; after this if there is no great pain or swelling he may go about his usual avocations. On the day following the injection the tumor will be found to consist of a tense, hard mass, not particularly painful to the touch and of a bright-red color. It remains in this condition for two or three days, after which it begins to shrivel, and eventually there is nothing left at its site but an apparently normal mucous membrane somewhat more closely attached to the deeper tissues than is normal.

The Number of Tumors to be Injected.—Where there are several tumors it is well to select the one which is apparently causing the patient the most inconvenience, either through prolapse or bleeding, and inject this one first. It is not advisable to inject more than one tumor at the first sitting. After this, if there is no unusual disturbance, one may with safety prepare the patient and inject at the following sitting two or three of the remaining tumors in the same manner. The second injection should not be made sooner than five days after the first.

The Repetition of Injections.—In the majority of instances one never has to inject the same tumor more than once, but sometimes through overcautiousness and the injection of too small a quantity of fluid, sufficient inflammatory reaction to obliterate the pile is not produced and then the injection must be repeated.

The Solution.—After having tried many substances, the following modification of Shuford's solution has proved the most satisfactory:

℞ Ac. carbolic (Calvert's)	5ij;
Ac. salicylici	5ss;
Sodii biborate	5j;
Glycerinæ (sterile)	q. s. ad. 5j.
M. Sec. Art.	

The fluid should be of a sirupy consistence and perfectly clear. A milky-white appearance is due to imperfect solution, and invalidates its usefulness. The action of the salicylic acid consists in softening and destroying the epithelial and endothelial cells, thus producing an inflammation of the venous walls which eventually causes them to adhere together and completely obliterates their caliber. The biborate and carbolic acid act as irritants and antiseptics, causing the inflammation in the perivascular tissues.

Amount of Fluid to be Injected.—The amount of fluid to be injected in any individual tumor will depend upon its size. It is difficult to lay down any absolute rules for this; the largest tumor never requires more than 10 minims, and the quantity must be graduated from this

amount down to 2 or 3, the average injection being about 5 minims of the solution.

The Instrument.—No special instrument is necessary to make these injections. An ordinary hypodermic syringe with a metal plunger and a No. 21 hypodermic needle are all that are required. Fine needles do not allow the fluid to flow easily. It is convenient to have handle-bars



FIG. 197.—GANT'S SYRINGE FOR INJECTING HÆMORRHOIDS.

upon the syringe in order to steady it, as it sometimes requires considerable strength to force the fluid through the needle. Special

syringes and needles, such as those devised by Agnew and Gant, are convenient, no doubt, but they are not necessary. The curved extension on Gant's syringe (Fig. 197) can be attached to any ordinary hypodermic syringe, and allows the operating hand to drop out of the line of vision, and is therefore useful.

The After-treatment.—After a hæmorrhoid has been injected by this method there is comparatively little pain, and no opiates, sedatives, or local applications are required. A suppository of opium, belladonna, and iodoform may be introduced for the first two nights to prevent the bowels from moving, but it is not necessary for the relief of pain. The bowels are confined for forty-eight hours, after which they are moved either by a gentle laxative or a cold-water enema. This is repeated every day, and the patient is allowed to go about his business after the first twenty-four hours. Thus practically there is no after-treatment. The inflammatory condition gradually subsides, and the protrusion and bleeding usually cease from the first day.

Accidents and Complications.—Prolapse of an injected hæmorrhoid may occur within the first twelve or fourteen hours after the operation. The patient should be warned against straining or too long standing until the danger of this has passed. If by any accident, through passing gas or otherwise, the injected tumor should slip outside of the sphincter, it should be replaced at once by gentle pressure with a soft sponge or wad of cotton; if the patient is unable to do this he should send for a physician and have it done at once. If this is not done strangulation and sloughing may occur.

Sloughing.—Since beginning this method of treatment the author has had sloughing in 3 cases only; in these he was unable to account for the cause unless it was due to his having injected the fluid too

close to the surface of the tumor. The condition in each of these cases was simply a sloughing out of the central portion of the tumor, leaving a sort of fissure between the hardened masses upon each side. In 1 of them the tumor was low down and occasioned a great deal of pain and annoyance; in the other 2 the tumors being high up gave the patients no trouble whatever beyond the alarm occasioned by seeing a little blood and pus secreted from the rectum. All 3 cases, however, recovered after five or six weeks, and the tumors entirely disappeared.

As to abscess, sepsis, hæmorrhage, thromboses, and affections of the liver, which are said to follow this method of treatment, the author has had no experience with any one of them; sepsis or abscess is hardly possible if it is properly carried out. There is nothing in the solution that is septic or capable of producing pus; if the needles and the syringe are properly sterilized before they are used, and if the tumor is cleansed with antiseptic solutions so that no infecting germs can be carried in from its surface by the needle, it is not likely that an abscess or an infection of any kind will ever be produced by it. Gant, who has employed the method for a considerable time and with more or less success, records one notable failure in his experience in which an abscess and slough were produced by injecting a hæmorrhoidal tumor. He states, however, that upon careful examination he found in the abscess a small focus in which there rested a minute mass of fæcal matter evidently carried in upon the end of his needle, thus accounting for the infection of the tumor.

Hæmorrhages can not occur when the mucous membrane is not broken through ulceration or sloughing, and as the method does not produce this, they will never be seen unless some other complication appears.

Recurrences.—The strongest point in Kelsey's argument (*op. cit.*, p. 183) against this method of treatment consists in the statement that the operation does not radically cure. He says that relief continues for about three or four years, after which the hæmorrhoids return even worse than before. Granting that this is true, the fact remains that the hæmorrhoids are in no worse condition for operation upon their recurrence, and the large majority of patients would much prefer to take this chance with respite from the operating-table for so considerable a time. The author has had cases return to him for treatment after he had injected internal hæmorrhoids, but upon careful examination it has nearly always been found that the hæmorrhoid was at a different part of the anal circumference from that at which the original injection was made. In a very few cases recurrences *in situ* have taken place, and in only 2 in which the injection treatment was

used has it ever been necessary to do a more radical operation. All the recurrences observed have taken place in six to twelve months, and many patients injected six to nine years since have never had the slightest return.

When the piles do recur, they may be treated again after the same method quite as successfully as at first. The probability of such results should be frankly stated to the patient before adopting this line of treatment, but the majority will prefer periodic treatment of this kind rather than submit to radical operations. It is not claimed that this method is superior or even equal to the accepted surgical procedures, but it is maintained that the accidents and complications which follow it have been greatly exaggerated by writers upon this subject, and that most satisfactory results can frequently be obtained through it in properly selected cases.

In all the strictly operative methods certain preliminary procedures are necessary, such as preparation of the patient, anæsthesia, and dilatation of the sphincter.

Preparation of the Patient.—In order to obtain the best results, patients should be as carefully prepared for hæmorrhoidal operations as for laparotomy. The bowels should be thoroughly emptied twenty-four hours before the time, and only light diet allowed during that period. Rochelle salts, or a full glass of Rubinat, Apenta, or Hunyadi water, given early in the morning and repeated if necessary in three hours, will accomplish this purpose. The evening before the operation a bichloride dressing should be applied to the anus and retained by a T-bandage. If excision is to be practised, the perinæum and anus should be shaved, but this is not necessary for the ligature or clamp-and-cautery operations. The patient should have a quiet, restful night before the operation, even if trional or chloralamine has to be given. Three hours before the operation a salt-and-soap enema should be given; when this passes the parts should be washed and the dressing reapplied. After the patient is anæsthetized and in position on the table the sphincters should be dilated, the rectum irrigated with a 1-to-3,000 bichloride solution, and the external parts surgically cleaned. The order of procedure in this is important, for if the external parts are prepared before the sphincter is stretched and the rectum cleansed, fæcal matter from the latter may come down and soil the outer field. The bladder should always be emptied before beginning any operation on the rectum, and if necessary this should be done with a catheter before cleaning up the operative field.

While such preparation is advisable in all cases, it is sometimes almost impossible, and those who have done clinical work know that it is not indispensable in the clamp-and-cautery operation, for the hot

iron destroys germs and seals the lymphatic and blood-vessels against septic absorption.

The Anæsthetic.—Hæmorrhoids may be operated on under local or general anæsthesia. The chief pain is produced by stretching the sphincter, and it is said by Reclus and Bodine that this can be done painlessly by the hypodermic injection of weak solutions of cocaine or eucaine, but such has not been my experience. Infiltrating the parts with sterile water does not obviate the pain of stretching and therefore some prefer to cut the muscle. This we consider unnecessary mutilation. If these local methods of anæsthesia are selected the ligature or Earle operation should be employed. In the clamp and cautery operation the inhalation of the ethyl chloride or nitrous oxide gas is quite satisfactory. In using them the patient should be given a hypodermic injection of morphine ten minutes before the operation, and should be placed in the lithotomy position before beginning the anæsthetic. In difficult or long operations, ether or chloroform should be employed.

If "spinal anæsthesia" proves to be without danger, it will be superior to either chloroform or ether in operations for hæmorrhoids, because the nausea disappears before the operation is completed, the oozing is much less, and the anæsthesia is so prolonged and fades so gradually that the patient is practically over his initial pains before sensibility returns. The bowels, however, must be thoroughly emptied before attempting plastic operations under it, as involuntary movements are very likely to occur and soil the operative field. The remote effects of puncture and injection of foreign fluid into the spinal canal, however, remain to be seen.

Position of the Patient.—The position in which one operates is largely a matter of habit and early teaching. Allingham and the majority of operators prefer the lithotomy position, Mathews advises the Sims's position, and some operators prefer having the patient swung in the knee-chest posture. The lithotomy position is generally the most convenient except in cases with ankylosed hips, and in these it is necessary to select that which gives the easiest access to the parts.

THE LIGATURE.—The ligature has been for many years the most popular method among surgeons for the treatment of hæmorrhoids. It has numbered among its advocates the most noted and scientific men in the medical profession. It is perhaps to Allingham more than to any other that this operation owes its popularity. It is applicable to almost every variety, and whatever else may be said against it, no one can deny its effectiveness in the cure of hæmorrhoids. In this country Mathews has been the most brilliant and consistent advocate of this operation. There are several methods of applying it. The

three which will be described are those of Mathews, Allingham, and Rickets.

Mathews's Method.—The patient is placed in Sims's position, the sphincters dilated, and forceps or small retractors are used to bring

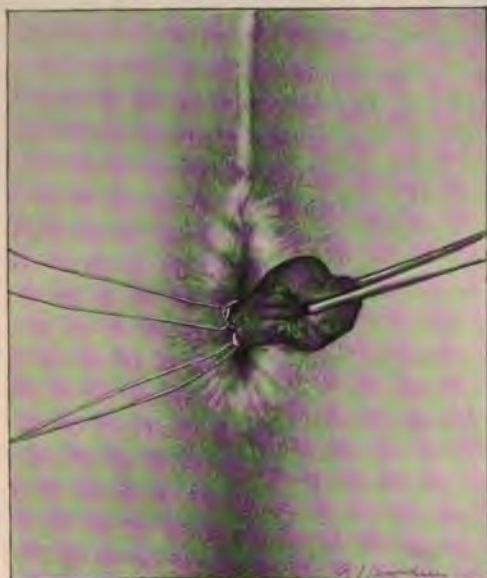


FIG. 198.—TRANSFIXION AND LIGATURE OF HÆMORRHOID.

the hæmorrhoids into view. Small tumors are caught and tied off with fine thread, either linen or silk. Where there are no skin-tabs or hypertrophied folds around the anus, no cutting whatever is done. "The large tumors are caught well at their base, drawn stoutly down by the forceps, held there by an assistant, and a curved needle threaded with stout silk is passed immediately through the base. The needle is now cut away and the ligatures tied stoutly, first on one side of the tumor, then on the other (Fig. 198). Having the tumor tightly

tied on each side, the pile is now cut off with a pair of straight scissors."

The amount of the tumor to be cut away is a matter of individual judgment, although Mathews indulges in a somewhat extensive argument with regard to the danger of cutting off too much or too little. Only so much of the mass should be left as will thoroughly hold the ligature. After the tumors are removed, he places a piece of iodoform or bichloride gauze against the stumps and pushes them back into the rectum. A large anal compress is placed in position and held by a T-bandage. "The patient is then given a hypodermic injection of $\frac{1}{4}$ of a grain of morphine and $\frac{1}{100}$ of a grain of sulphate of atropine before he is taken to his room. This is repeated in one or two hours if necessary." He also uses sulphonal in 15- or 20-grain doses, to control the spasm of the sphincter. If the hæmorrhoids are complicated by external connective-tissue growths, he makes an incision in the skin around these growths, transfixes them along with the internal tumor, and ties one ligature in the groove produced by this incision and another on the mucous membrane. He then cuts off the summit of the tumors, thus removing them all in one mass. With

regard to the amount of external tissue taken off with external hæmorrhoids, he states that the danger is always in taking off too little rather than too much; that one of the most annoying complications of this operation consists in an inflammation of the superfluous flaps of skin at the margin of the anus, and that if a good sweeping cut is made entirely around the skin-tab to be removed, the patient will be much more comfortable afterward and there will be very little danger of anal stricture.

Allingham's Method.—The operation generally known as Allingham's was devised by Mr. Salmon more than fifty years ago, and has been almost invariably practised at St. Mark's Hospital, London, since that time. The method, as described by him, is as follows:

"The patient, having been previously prepared by purgatives, is placed on the right side on a hard couch in a good light, and is completely anæsthetized, and then the sphincter muscles are gently but completely dilated. This completed, the rectum for 3 inches is within easy reach, and no contraction of the sphincters takes place, so that all is clear like a map before one. The hæmorrhoids, one by one, are to be taken by the surgeon with a volsella or pronged hook-fork and drawn down; he then, with a pair of sharp scissors, separates the pile from its connection with the muscular and submucous tissues upon which it rests; the cut is to be made in the sulcus or white mark which is seen where the skin meets the mucous membrane, and this incision is to be carried up the bowel, and parallel to it, to such a distance that the pile is left connected by an isthmus of vessels and mucous membrane *only*.

"There is no danger in making this incision, because all the larger vessels come from above, running parallel with the bowel *just beneath the mucous membrane*, and thus enter the *upper part* of the pile. A well-waxed, strong, thin, plaited silk ligature (Turner's No. 6) is now



FIG. 199.—LIGATION OF HÆMORRHOID AFTER ALLINGHAM'S METHOD.

to be placed at the bottom of the deep groove which has been made, and the assistant then drawing the pile well out, the ligature is tied high up at the neck of the tumor as *tightly* as possible (Fig. 199). One must be very careful to tie the ligature, and equally careful to tie the second knot, so that no slipping or giving way can take place. We always tie a third knot; the secret of the well-being of the patient depends greatly upon this tying—a part of the operation by no means easy (as all practical men know) to effect. If this be done, all the large vessels in the pile must be included. The arteries in the cellular tissue around and outside the bowel are few and small, as they do not assist in the formation of the pile, being outside it. These vessels rarely require ligaturing. The silk should be so strong that it can not be broken by fair pulling. If the pile be very large, a small portion may now be cut off, taking care to leave sufficient stump beyond the ligature to guard against its slipping.”

After the piles have been tied, if they are small ones he does not cut them off, but leaves them to be cut through by the ligature. Any skin-tabs or superfluous muco-cutaneous membrane around the margin of the anus are cut off with scissors, the bleeding being checked by compression. A point which is well brought out by Allingham is the necessity of making the pedicle of the hæmorrhoidal tumor as small as possible without dividing the chief arterial supply. If it is large and broad, and there are several hæmorrhoids about the rectum, the ligatures will draw the mucous membrane together and produce considerable contraction of the caliber. In this way marked stricture may be produced. By making a narrow pedicle one leaves little strips of mucous membrane around the rectum which conduce to rapid healing of the parts.

Operators in this country are about equally divided in their preferences for the Mathews and Allingham operations. In the latter the amount of tissue to be cut through by the ligature is less and the granulating surface smaller, but there is more danger that the ligature will slip off the stump and cause secondary hæmorrhage than in the transfixion method of Mathews. But hæmorrhage, either primary or secondary, from hæmorrhoidal operations seems to be somewhat of a bugaboo to frighten young operators and make them careful. In an experience of twenty years the author has never seen any serious hæmorrhage follow an operation for hæmorrhoids by injection, ligature, clamp and cautery, or dissection, save in 1 case, which will be detailed later.

Whatever else may be said against the ligature operation, two things stand out in bold relief: *it is slightly if at all dangerous to life, and it absolutely cures the disease.* Accidents and deaths have followed this

operation, as they have almost every other surgical procedure. They are so few, however, that one need hardly consider them when the conditions justify the removal of the hæmorrhoids. Copeland, Curling, Sir Benjamin Brodie, Agnew, Van Buren, Ashhurst, Gross, Sands, Cooper, Goodsall, and hundreds of other leading surgeons throughout this country and Europe have expressed their preference for this operation over all others, and with few exceptions have seen no fatal results. Allingham has recorded five deaths in over four thousand operations; Curling reported one death; Agnew saw three deaths all due to tetanus; and Mathews, up to the time he completed his thousandth case, had never had one from this operation in his own practice.

After-treatment.—Allingham attributes all the unfortunate results which follow this method to the after-treatment. He confines the bowels for four or five days, and uses opium freely for this purpose and for the relief of pain. On the day following the operation the outside dressing is removed, the parts are dusted with iodoform or some other powder, and after this only small pledgets of dry gauze will be necessary. To some patients a dressing moistened in some form of antiseptic solution is more grateful.

The bowels are moved, according to the necessity of the case, after four or five days. Whatever laxative is selected should be given in sufficient dose to compel the movement of the bowels even against the patient's resistance, for at this time the sphincter will have regained its tonicity, and the fear of pain will cause the patient to hold the movement back as long as possible. When the inclination for a movement begins to be felt, an injection of warm sweet-oil into the rectum will facilitate it, and prevent any friction by the fæcal mass upon the stumps and ligatures. In the majority of cases the patient may sit upon the commode for this purpose; it makes the movement easier and causes less straining than when the bedpan is used. As Allingham says, there are cases so anæmic and debilitated that the recumbent posture is desirable, and in these the use of the bedpan for several days will be necessary. After the bowels have once moved, 8 ounces of boric-acid solution should be injected into the rectum, and expelled again in order to wash away any fæcal material which may have adhered to the raw surfaces. If there is any difficulty in obtaining a movement of the bowels, the finger should be introduced at once to ascertain if impaction has taken place, and if so it should be broken up. Allingham advises the introduction of the finger into the bowel every day after the first week in order to avoid any contraction; he confines the patient to bed for one week or more, and does not allow him to walk about until the wounds are healed.

After the bowels have moved for the first time, gentle traction

should be made upon the ligatures daily in order to withdraw them when they have cut their way through. This should be very carefully done lest too much dragging should tear off a pedicle and thus bring about secondary hæmorrhage.

The time required for complete healing by these two methods is from twenty-five to forty days. The period of confinement to bed is from five days to three weeks, according to the temerity of the operator.

Submucous Ligature.—Merrill Ricketts, of Cincinnati, has recommended the submucous ligation of hæmorrhoids. He claims for it the following advantages: Impossibility of secondary hæmorrhage; no tissue

is destroyed or sacrificed; the time of confinement is very short; there is no protracted ulceration, and in his experience up to the time of the report, there had been no infection of any kind; the pain is less than by other methods of ligation; there is absolutely no contraction in the caliber of the gut.



FIG. 200.—SUBCUTANEOUS LIGATION OF A HÆMORRHOID.

His method is as follows: The sphincters are dilated and the parts prepared, as has been already described. A needle curved

to rather more than a semicircle, and threaded with moderate-sized kangaroo tendon, is passed submucously around the base of each prominent hæmorrhoid (Fig. 200). After the ligatures have all been passed, they are then tied so that the knot slips through the aperture made by the needle and buries itself in the submucous tissue, the ends being cut off very short. After this the hæmorrhoids become very much distended, and it is sometimes necessary to puncture the larger ones and allow the blood to escape in order to prevent sloughing. The tumors are then replaced within the sphincter, and a firm compress placed upon the anus to prevent their prolapsing.

Ricketts states that "after a few weeks" atrophy takes place to such a degree as to completely destroy all the objectionable "varices" which formerly existed.

The method sounds reasonable, and is no doubt effectual, but the dangers of infection and subsequent abscess must not be ignored. Some

little experience with the buried ligature in the treatment of rectal prolapse has convinced the writer that this danger is less than is usually supposed, and Ricketts's experience corroborates this view. If the ligatures overlap or loop into each other the method will result in a certain amount of contraction in the caliber of the rectum.

CLAMP AND CAUTERY.—This operation for hæmorrhoids was first suggested by Cussack about 1846. His method consisted in clamping the hæmorrhoid with a strong forceps, cutting off the protruding portion, and cauterizing the stump with nitric acid. Mr. Henry Lee adopted the method in England, and it was through his influence that Henry Smith was led to put it into practice in 1861. He did not use nitric acid, but cauterized the ends of the stump with the actual cautery. He emphasizes the importance of having the blades of the clamps mortised on one side and elevated on the other, with serrated edges, and even in his early operations called attention to the fact that the catching of integument in the clamp caused more pain than all the rest of the operation. The principles upon which the operation is based consist in the double protection against hæmorrhage through crushing and cauterization, the destruction by the actual cautery of all septic germs which may be distributed over the parts at the time of the operation, and in sealing up capillaries and lymphatics to prevent septic absorption. The operation is completed at one sitting; there are no ligatures to cut through by slow and tedious process; there is no protracted irritation about the nerves, no sutures to be removed, and, according to the pathology of Smith's day, the operation was thus free from the dangers of tetanus. After a prolonged experience with this method, the author agrees with the statement of Smith that there is no operation which compares with it for universal application, ease of performance, certainty of results, and freedom from after-complications. One objection to the operation is that it requires a somewhat elaborate paraphernalia. The clamp, the proper kind of forceps, the Paquelin or iron cautery with a heating apparatus, are indispensable to its performance. The objections offered by Allingham, Mathews, and some other advocates of the ligature, that this operation is painful, subject to secondary hæmorrhages, and often produces stricture, are without foundation in the experience of those who have used it most. If any operator should take up an external or mixed pile and apply a ligature around it without cutting a groove in the skin or dissecting up a pedicle, these two eminent authors would stamp him at once as a tyro in surgery, and would not hesitate to disclaim such operations as representative of their own. Yet the description and illustrations of Smith's operation in the books of the surgeons just mentioned are equally as far from the correct technique

of the clamp-and-cautery operation. Its freedom from pain, the dangers of secondary hæmorrhage, protracted ulceration, prolonged dysuria, and the short confinement which it necessitates, render it one of the simplest and surest of surgical procedures.

The Forceps.—If the tumor be

taken off in a line parallel with the long axis of the gut, the cicatrix will tend to hold the mucous membrane in position, overcome any inclination to prolapse, and if it contracts it can only shorten the rectum and not narrow its caliber. Appreciating this fact, the author devised, some years ago, the forceps illustrated in Fig. 201. As will be seen, the instrument possesses a linear bite of about $\frac{3}{4}$ of an inch in length, in



FIG. 201.—TUTTLE'S HÆMORRHOIDAL FORCEPS.



FIG. 202.—PILE SEIZED WITH HÆMORRHOIDAL FORCEPS.

each jaw of which there are four sharp teeth. The jaws of the forceps are parallel with the blades, and the handles are provided with a lock catch, so that when the hæmorrhoid is once grasped it will neither tear out nor be let loose. By introducing the instrument parallel with the long axis of the gut, it is impossible to catch the tumor in any other line (Fig. 202), and by applying the clamp under the forceps (Fig. 203), it will always grasp the tumor in this same line. The resulting cicatrix will necessarily run up and down the rectal cavity and not around it. This instrument facilitates the operation

greatly as well as accomplishing the given end, and although not indispensable, it is a most useful adjuvant in the clamp-and-cautery operation.

The Clamp.—Almost every operator who has relied largely upon this operation for hæmorrhoids has at some time or other devised a clamp after his own views. The original clamp of Lee consisted in a

sort of curved fenestrated forceps by which the tumor was clamped and crowded into a central pedicle or mass; that devised by Smith has flat blades, on one side of which are ivory plates intended to prevent the transmission of heat to the tissues beneath during the cauterization; the blades are also very wide in order to protect the surrounding parts from being touched by the cautery. These ideas are ingenious, but the ivory plates are unnecessary, and the broad blades are inconvenient, especially in stout people. Gant's clamp (Fig. 204) is a modification of Smith's, and has the merit that the blades open and close absolutely parallel.

The author uses the original Kelsey modification of Smith's clamp (Fig. 205). It differs from the latter in having longer and more convenient handles, which afford an opportunity for a stronger grasp; the blades are narrower, have no ivory plates beneath them, and are provided with a tongue and groove, all three edges being serrated in order to prevent the tumor's slipping as it is grasped by the clamp. The instrument is a powerful one, and affords the

means of completely crushing a tumor, if necessary; the older patterns had rubber handles, but these have been supplanted by metallic ones which can be sterilized without injury. Ware has improved this clamp by substituting a ratchet catch for the screw.

The Cautery.—It consists in a reservoir containing benzine, which is connected with a double hand-bulb upon one side and an ingenious hollow platinum knife or bulb upon the other. The platinum point is heated to a dull-red heat in the alcohol flame, and then the benzine vapor is pumped into it, causing combustion and the maintenance of heat to any degree required.

There are a number of modifications of this instrument in the shops,



FIG. 203.—METHOD OF APPLYING THE CLAMP AFTER THE HÆMORRHOID IS DRAGGED DOWN.

but in most of them the platinum knife is made so light that it will not retain the heat when applied to a wet surface, and one has continually to wait and fire it up again. In some of them the blade is heated by the benzene being vaporized and burned upon the outside of the knife so that the alcohol-lamp is unnecessary (Fig. 206). Gasoline may be used instead of benzene in these instruments.



FIG. 204.—GANT'S HÆMORRHOIDAL CLAMP.

The fact that these instruments so frequently get out of order renders a few words upon their management not inappropriate. The instrument is based upon the principle that highly combustible gases ignite at a low temperature, and, continuing to burn, increase the heat in the bulb or knife. There is one tube leading into the bulb which carries the vapor and a second one for the escape of any superfluous amount. Now, if the vapor is pumped into the bulb before the latter is heated to a temperature sufficient to ignite it, carbon will be formed which obstructs either the entrance or exit to the blade, and thus prevents the proper action

of the instrument. A mistake is frequently made in pumping the vapor through the instrument after it has cooled off. As surely as this is done, the instrument will not work the next time it is tried. If one is careful always to avoid this and have the platinum tip well heated before compressing the bulb, the instrument will rarely be out of order. When the accident which thus disables the apparatus happens to occur, it is well to know that by placing the instrument in the flame of an alcohol-lamp or a Bunsen burner and heating it to a white heat, at the same time pumping air through it, the carbon will be consumed and the instrument will be restored to its usefulness. Another point to be



FIG. 205.—HEMORRHOIDAL CLAMP.

remembered is, that in that variety of reservoir which consists in a metal tank lined with sponge, one should always be careful to put no more benzene in than the sponge will absorb. If too much is

placed in the tank, it will be carried as a liquid into the instrument and thus obstruct it. Before etherizing the patient to operate by this method, one should always carefully examine his cautery and see that it is in working order, else he may be caught in the predicament where the clamp has been applied, the hæmorrhoid excised, and the cautery will not burn. If the precautions mentioned above are observed, the Paquelin cautery will be found a most useful and reliable instrument, not only for this operation, but for many other conditions which one meets in a surgical experience. It should always be used at a dull-red heat for controlling hæmorrhage, as the white heat cuts the vessels and does not shrivel and contract them as the red.

The use of the galvano-cautery in operating for piles is frequently suggested (Cutler, *Times and Register*, November 14, 1891). The heat

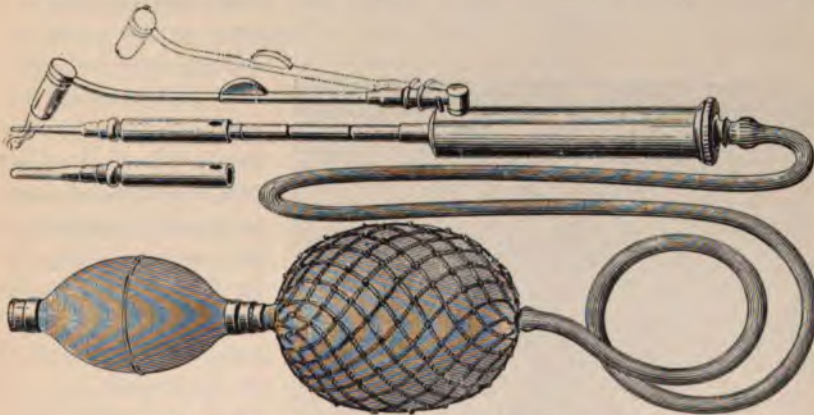


FIG. 206.—MODIFIED PAQUELIN CAUTERY (Kennedy's).

is too intense and too easily reduced to make it satisfactory even when the street current is used, and in operations at the patients' houses it is altogether impracticable.

The Operation Itself.—The patient having been anæsthetized, is held in the lithotomy position by a Clover's crutch (Fig. 130) or the uprights of a modern operating-table. The foot of the table should be somewhat higher than the head, and on a level with the shoulders of the operator who sits upon a stool. The patient being in position, the skin-tabs should be clipped off flush with the skin before stretching the sphincter, otherwise they swell up to such an extent that it is difficult to determine how much ought to be removed. After this the sphincter should be dilated and the parts prepared as already described.

After the sphincter is dilated and the piles brought into view, one should carefully note the position of the prominent hæmorrhoidal tumors. Generally they will be found to consist of three large ones:

one upon each side of the posterior commissure, and one just to the right of the anterior commissure, with occasionally a small hæmorrhoid to the left of the latter, and one directly opposite the posterior commissure. The important ones are the two lateral and one anterior tumors. If these three are removed the others will generally disappear spontaneously, especially if they are very small. They should also be removed if of considerable size. Having located the tumors, they may be allowed to recede if they do so spontaneously. The hæmorrhoidal forceps (Fig. 201) is then introduced closed directly over one of the lateral tumors, and as it is pressed outward in the direction of the latter, it should be gently opened to the extent of about 1 inch, and closed again. By this procedure the tumor rises into the grasp of the forceps, it is caught directly in the line of the axis of the gut, and it can be easily pulled down into view. Some little knack and practice are necessary to accomplish this deftly, and the beginner in this operation



FIG. 207.—GROOVE CUT INTO MUCO-CUTANEOUS TISSUE INTO WHICH THE CLAMP FITS.

will do well to introduce a Sims's duck-bill speculum upon the opposite side, or drag the tumor down and catch it by sight instead of by touch, as above described. When the tumor has been grasped and dragged down, if it is covered in its lower portion by mucocutaneous or cutaneous tissue, a groove (Fig. 207) should be cut into these sufficiently deep to prevent their being grasped by the clamp. The application of the clamp and cautery to the mucocutaneous tissues or the skin is the cause of almost all the pain associated

with this operation, and if this little precaution is strictly adhered to the suffering following this operation will be comparatively slight. The clamp is now slipped over the forceps (Fig. 203), the heel being upward in reference to the rectum, for the reason that if by any accident part

of the tumor should slip out of its grasp, it would always be the lower portion, which is the least tightly held. This will be within view, and any bleeding from it can be easily controlled. The tumor having been grasped by the clamp, with the blades of the latter fitting into the sulcus cut in the mucocutaneous covering, the screw upon the clamp should always be tightened in order to prevent any possible relaxation of the grasp until the cautery has been applied. The forceps should then be removed, and the summit of the tumor cut off to about $\frac{1}{8}$ of an inch of the clamp (Fig. 208), thus leaving a stump sufficient to be thoroughly charred without destroying that part of the tumor which is crushed by the clamp. This is an important part of the technique, as the



FIG. 208.—STUMP OF EXCISED HÆMORRHOID HELD BY CLAMP.

crushed portion of the stump forms the original barrier to hæmorrhage and should never be destroyed by burning down between the blades with the edge of a Paquelin knife, as is sometimes done. The tumor having been removed, the stump should then be cauterized with a Paquelin or iron cautery heated to a dull-red heat; it is not necessary to burn the tissue all away, but simply to char it thoroughly until it presents a smooth black surface; the grasp of the clamp should then be slowly relaxed in order to observe if there is any point at which there is bleeding from the stump. In case there is, the clamp should be retightened and the cautery reapplied. If there is no bleeding, the clamp may be removed and the stump will spontaneously recede. The second lateral tumor and then the anterior one should be treated in like manner, and if the operator deems it advisable he may also remove the two smaller tumors which sometimes exist upon the left anterior and central posterior quadrants.

The tumors having been removed, there are two methods of treating

the wounds: one is the application of a soft fluffy piece of gauze, infiltrated with orthoform, to the external raw surfaces left by cutting off the external hæmorrhoids; this is covered with a good pad of gauze or absorbent cotton, and held in position by a snug T-bandage. The orthoform is somewhat antiseptic in its action; at the same time it is a local anæsthetic to fresh and granulating wounds; it obviates the necessity of administering opiates after the operation, and is by far the most comfortable dressing for the patient. If the sphincter is thoroughly relaxed and has no tendency to recontract immediately, this dressing is quite as satisfactory as any other. In some cases, however, it seems impossible to thoroughly paralyze the sphincter by stretching; and, however completely the latter is done, one will find by the time the operation is completed that this muscle has already begun to show a tendency to recontract. In such cases the operator should use a Pennington tube, which consists of a piece of medium-sized stiff rubber tubing about 6 inches long, attached to which is a sheath of very thin rubber; the tube is wrapped with iodoform or plain gauze until its size is sufficient to keep the sphincter well dilated, and the rubber sheathing is then folded over this gauze. The whole is then introduced for about 4 inches into the rectum with the open end of the sheath downward, orthoform having been dusted upon the raw surfaces about the anus. The tube serves to allow the escape of any gas which may accumulate in the rectum, to control bleeding by its pressure, and to maintain the dilatation of the sphincter, while the rubber sheath prevents granulations from forming in the meshes of the gauze, and allows the plug to be withdrawn whenever it may be desirable without any adhesion or pain. Gauze is then packed around the lower end of this tube and a snug T-bandage is applied through which the end of the tube protrudes in order to prevent pressure upon the latter. A large safety-pin is fastened through the end of the tube in order to prevent its escape upward into the rectum, and thus the dressing is completed.

As a rule the author is opposed to the use of any plug or tampon in the rectum, but in the class of cases described above he has found this method of Pennington's to be of great service; it can be removed on the second or third day, or it may be allowed to come away with the first movement of the bowels. Recently we have used bicarbonate of soda instead of orthoform in dressing wounds made with the actual cautery. The prevention of pain has been remarkable. The remedy should be applied freely to the operative field before adjusting the tube or gauze dressing.

After-treatment.—Usually a hypodermic injection of morphine is given before the patient leaves the table, and this is all that is necessary during the whole course of treatment. On the second night following the operation twenty to thirty minims of fluid extract of cascara should

be administered; when the bowels feel like moving two ounces of sweet-oil should be injected into the rectum. This may be done through the tube, if one has been used, and then the latter should be withdrawn. After the movement has occurred, an enema of about one pint of boric-acid solution should be given, which immediately comes away and clears the operative field of any small faecal masses which may have adhered to it; this should be repeated daily for one week, regulating the amount of laxative to the needs of the patient. After the bowels have moved, a small piece of gauze or cotton infiltrated with aristol or some such powder should be applied to the anus two or three times a day to keep it dry. If there is a tendency to recontraction and spasm of the sphincter, the introduction of a full-size Wales bougie daily will relieve it, but this is very rarely necessary.

The time for complete healing after this operation varies from two to four weeks, the average being about twenty-one days. Patients are allowed to get out of bed after the bowels have moved on the third day. They can generally walk about without any distress, but sitting will be found uncomfortable. As a rule they leave the hospital and return to their homes or to work on the sixth or seventh day. They are allowed to use the commode even for the first movement of the bowels, and are never required to use a bedpan unless there is some complication. There is often some bleeding after stools for the first week, but it is never alarming, and only comes from the granulating surfaces. It gradually disappears, and, with the exception of a little moisture from the discharge, the patient suffers no further inconvenience.

THE CRUSHING OPERATION.—Crushing is an old operation for hæmorrhoids. Formerly it was the practice to seize the whole tumor with a powerful flat-jawed forceps and crush it, leaving the pulp thus formed to slough away. This method is now obsolete.

Chassaignac conceived the idea of crushing off hæmorrhoids with his *écraseur*, and practised it to some extent; but the operation never became popular, and is not done at present. Later, several instruments were devised for crushing off the pile at its base. Among them was Benham's crusher, and in 1880, Pollock, of London, made a strong plea for this method and instrument in the following words:

"It is now some two or three years since I commenced to put in practice these views. The earlier attempts to crush the base of the pile were occasionally partial failures as regarded the perfect freedom from hæmorrhage. Either from want of proper construction the clamp did not effectually spoil the tissues at the base of the piles; or, perhaps, from too much of the protruding mass being taken up at a time to enable the clamp to act efficiently, or from some other unexpected cause, some bleeding would occur after the clamp was removed, the pile having been

cut away; and this had to be dealt with by ligature. Seldom, however, were more than two or three ligatures necessary, and never was troublesome or recurring hæmorrhage encountered. As successive cases continued to be treated in this manner, any defects of the clamp became manifest, and gradual improvements were made. Still, the theory that crushing the base of the pile should entirely obviate the occurrence of hæmorrhage on the separation of the pile and subsequent removal of the clamp, was not as yet fully realized by the results. Sometimes we had no bleeding; sometimes three or four vessels might be required to be ligatured. But still the one satisfactory result observed in all cases thus treated was that the subsequent pain was quite an insignificant matter. It is not wished to imply in this statement that no one ever complained of pain; but in contrast to the pain attendant on ligature, or that noticed after the application of the hot iron, certainly that which has been observed after this system of rapid crushing may almost be said to be a *minus* quantity. One patient complained of pain for about three hours. In all cases patients have expressed themselves free



FIG. 209.—ALLINGHAM'S HÆMORRHOID CRUSHER.

from severe pain, and many have hardly complained of any after an hour or two. One who had some years previously undergone an operation by ligature, expressed his extreme gratification at the almost entire absence of even discomfort after the first effects of the ether had gone off" (The Lancet, vol. ii, p. 1, 1880).

Allingham states, after trying Pollock's method, that he found the instrument did not crush the base thoroughly, and that more or less bleeding always resulted. In one case a bad concealed hæmorrhage took place. It was from the crushed hæmorrhoid, and flowed upward into the bowel. Some hours after the operation the patient, being seized with a desire to go to stool, evacuated a large quantity of arterial blood, and this bleeding was continued until checked by cold-water irrigation and tamponing of the rectum with wool and perchloride of iron.

After this he devised a crusher (Fig. 209) in which the power is exercised by a screw. To use this instrument a special form of forceps is necessary (Fig. 210). He calls attention to the importance of crushing the hæmorrhoids longitudinally and not transversely. Pollock crushed both external and internal hæmorrhoids by his method, but Allingham

advised making an incision at the muco-cutaneous border, and only crushing the internal piles.

Mr. Charles John Smith, of Farrington Dispensary, has devised a modification of Allingham's crusher (Fig. 211) which appears to have some advantages over the latter in the application of the power, and in the fact that the instrument is applied to the pile instead of the latter being dragged through a fenestrum in the instrument. He advocates crushing the



FIG. 210.—ALLINGHAM'S FORCEPS FOR USE IN CRUSHING OPERATION.

pile transversely to the axis of the gut, arguing that dilatation being in this line, there will be less danger of the wound being torn open. This danger, however, is not to be compared with that of stricture, which is never produced by the former method.

Ten years since, being impressed with the idea that the clamp would effectually control the bleeding following excision of hæmorrhoids, and that granulation would start up more readily there being no eschar from the cautery to come away, the author made some experiments with this method, using the old-style hæmorrhoidal clamp with mortised, serrated edges and long, strong handles. Both external and internal piles were crushed off; they were caught with the hæmorrhoidal forceps, dragged out, and the clamp applied at the point where the tumor joined the mucous or muco-cutaneous tissue, then with a slow, chewing motion the base of the tumor was crushed until a sort of pedicle or neck was formed, outside of which it was cut off with scissors. Frequently it was possible to remove the tumor by the crushing power of the clamp alone; especially was this the case in external hæmorrhoids. The results justified in a measure all that Pollock claimed for the method. After operating upon 25 cases by this method, a hæmorrhoid slipped out of the



FIG. 211.—SMITH'S HÆMORRHOID CRUSHER.

clamp after the summit had been cut off in an operation by the clamp and cautery. It is true that the pile was only partially crushed in this instance, but the author was so impressed with the possibility of such an accident occurring after the crushing method that

he has never done the operation for internal hæmorrhoids since. In external, inflammatory, or connective-tissue hæmorrhoids this method is still employed. The operation may be done in these cases under the influence of cocaine. The crushing brings the muco-cutaneous edges so accurately together that one can hardly see that any tissues have been

removed. After having crushed the tabs off, collodion should be applied, and the parts will often heal just as if they had been sutured by the subcutaneous method. No hæmorrhage follows this method in external hæmorrhoids, and very slight inflammation ever occurs. The cauterization of the stump, however, is a safeguard against hæmorrhage and adds an aseptic element which the crushing operation does not do.

Recently some operators have been using the angeiotribe in carrying out the crushing operation. While this method is very effectual, the size and weight of the instrument seem to preclude the possibility of accurately applying it to anything except very large masses. If an instrument of this type, but less cumbersome, could be devised, there is no doubt that it would prove very useful, but none of those in use at present are superior to the old Kelsey clamp used in the method which has been described.

EXCISION.—For many years there have been advocated from time to time divers methods of complete excision of hæmorrhoidal tumors. Es-march, Dupuytren, Brodie, and Cooper excised the piles, tied the bleeding vessels and left the open wounds to heal. Pennington (*Internat. Jour. of Surgery*, 1900, p. 360) has revived this method; but most operators consider it a more surgical procedure to excise the tumors and sew the edges of the mucous membrane together, thus closing the wounds.

Whitehead Method.—In 1882, Mr. Walter Whitehead, of Manchester, after a brief and unsatisfactory experience with the ligature, and clamp and cautery, introduced total excision of the hæmorrhoidal area—i. e., the lower inch and a half of the mucous membrane of the rectum (*Brit. Med. Jour.*, 1882, vol. i, p. 149).

In his first operation (*Brit. Med. Jour.*, 1882, vol. i, p. 149) he left strips or islets of mucous membrane between the dissected areas in order to prevent circular stricture of the lower end of the rectum if primary union failed to take place. His final and perfected technique, that which is now accepted and taught under his name, does not embrace this feature. He described it as follows (the italics are ours):

“1. The patient, previously prepared for the operation and under the complete influence of an anæsthetic, is placed on a high, narrow table in the lithotomy position, and maintained in this position either by a couple of assistants or by Clover’s crutch.

“2. The sphincters are thoroughly paralyzed by digital stretching, so that they have ‘no grip,’ and permit the hæmorrhoids and any prolapse there may be to descend without the slightest impediment.

“3. By the use of scissors and dissecting forceps, the mucous membrane is divided at its juncture *with the skin* round the entire circumference of the bowel, every irregularity of the skin being carefully followed.

"4. The external and the commencement of the internal sphincters are then exposed by a rapid dissection, and the mucous membrane and attached hæmorrhoids, thus separated from the submucous bed on which they rested, are pulled bodily down, any undivided points of resistance being snipped across, and the hæmorrhoids brought below the *margin of the skin*.

"5. The mucous membrane above the hæmorrhoids is now divided transversely in successive stages, and the free margin of the severed membrane above is attached, as soon as divided, to the free *margin of the skin* below by a suitable number of sutures. The complete ring of pile-bearing mucous membrane is thus removed.

"Bleeding vessels throughout the operation are twisted on division."

Mr. Whitehead lays stress upon the point that the incisions are made entirely in the mucous membrane, but one may be misled by his references to cutting and suturing the "*margin of the skin*." He says: "It is important that no skin should be sacrificed, however redundant it may appear to be, as the little tags of superfluous skin soon contract and eventually cause no further inconvenience." He states that there is little difficulty in separating the piles from the sphincters, and that during this separation and dissection there is practically no hæmorrhage, the dissection being made by a raspatory or dull, curved scissors, or with the fingers. There are certain points around the rectum to which the attachment is closer than at others, on account of the passage of the branches of the middle hæmorrhoidal arteries through the muscle and into the mucous membrane. These points have to be snipped with scissors.

Mr. Whitehead uses no ligatures to control the arteries, but simply seizes and twists them with artery forceps as he makes his transverse section of the mucous membrane. He says: "I have often operated upon severe cases and not found it necessary to twist a single vessel, and very frequently only one or two." In the 300 cases reported, he did not have a single instance of secondary hæmorrhage, and therefore considers that this complication need scarcely be considered in the operation. Before closing the wound, he insufflates iodoform between the raw surfaces, in order to control any oozing which may exist. He uses carbolized silk sutures, and never takes out the stitches. An ice-bag is kept upon the rectum for the first few days, and the bowels are moved upon the fourth day. The patient sits up on the same day, and is allowed to resume his work in two weeks. The pain following this operation differs according to the personal equation. Some patients have absolutely none, while others suffer from burning pain in the parts, aching in the back, or throbbing and fulness in the rectum.

He claims for the operation, first, that it is the most natural method; second, it requires no special instruments; third, it produces a radical cure; fourth, it is as free from risks as any other operation; fifth, the pain following it is less severe than that following other operations for the same condition; and, finally, that the loss of blood at the time of the operation is inconsiderable, and the dangers of secondary hæmorrhage are decidedly less than after other operations. We have thus given largely in Mr. Whitehead's own words the description of his operation, the grounds upon which it is based, and his conclusions. That his experiences are not borne out by the majority of the operators in this country and in Europe is well known to the profession. His statement that the time required is short and the hæmorrhage at the time of the operation is inconsiderable has not been the experience of those who attempt the method according to his technique.

The large majority of operators object to the method on account of the amount of blood lost, the length of time it takes to perform it, the uncertainty of primary union between the cut edges, the danger of stricture following, and, finally, on account of the fact that this operation removes certain anatomical structures which are supposed

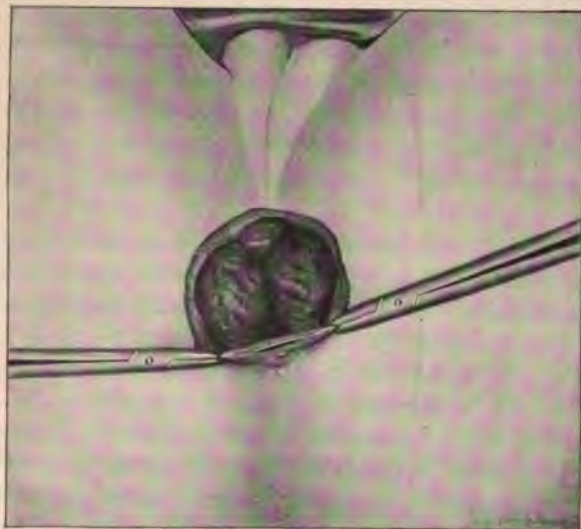


FIG. 212.—FIRST STEP IN MODIFIED WHITEHEAD OPERATION FOR HÆMORRHOIDS.

to have functions necessary to the healthy condition of the rectum. The fact that it removes the tactile or sensitive margin of the anus, the crypts of Morgagni, and the papillæ of the rectum, is held by some to take away the power of control, or rather the sense of warning as to when a movement of the bowel is likely to occur; this same result

may follow both the ligature and the clamp-and-cautery operations, and does not occur in any larger percentage of operations done after Whitehead's method. The time it takes to do the operation and the danger of subsequent stricture are the chief objections to it; the amount

of blood lost, while not alarming, is annoying and excessive compared with that in operations by clamp and cautery or the ligature. Recently, by modifying the technique, a great saving in time and loss of blood has been effected.

This modification is based on the fact that the blood-vessels and submucous tissue can be easily peeled off from the muscular wall of the gut from above downward.

The sphincters having been thoroughly stretched, an incision is made through the mucous membrane at the posterior commissure of



FIG. 213.—SECOND STEP IN MODIFIED WHITEHEAD OPERATION.

the rectum (Fig. 212), and with a blunt-pointed scissors, curved on the flat, dull dissection is carried upward to the superior margin of the internal sphincter; with a boring motion the instrument is insinuated between the mucous membrane and this muscle, and gradually worked to one side and downward until it comes to the muco-cutaneous border of the anus (Fig. 213); little by little the hæmorrhoidal mass is thus loosened from its muscular attachment and peeled out of its resting-place, just as an orange can be peeled from its skin. Having accomplished this upon one side, the instrument is turned to the opposite side and the same process is carried out. The only point at which any difficulty will be met in this procedure is at the anterior commissure of the rectum.

Having thus loosened the whole hæmorrhoidal-bearing area from its attachment to the muscular wall, the mucous membrane is cut just

above the muco-cutaneous margin, and the hæmorrhoidal area will thus be left loose in the rectum. An incision is then made in the mucous membrane at the posterior commissure, extending as high up as the hæmorrhoids extend. Each flap thus formed is caught by clamps, and the tube of mucous membrane, with the hæmorrhoids attached, is dragged down. It is loosened above by pressure with gauze or dull-pointed scissors until the healthy portion can be brought down to the margin of the anus without tension. It is then cut off transversely above the hæmorrhoidal mass, step by step, and sutured to the edge of the muco-cutaneous wound below (Fig. 214).

The hæmorrhage during dissection is very slight, and the blood-vessels cut in the transverse section of the mucous membrane are easily controlled by the sutures which are applied immediately thereafter; there is no occasion to either twist or tie them. A mattress-stitch thrown



FIG. 214.—THIRD STEP IN MODIFIED WHITEHEAD OPERATION.

around the artery will control it perfectly. The hæmorrhage and the time of the operation are materially reduced by this method, and the same end is accomplished as is designed by the Whitehead operation. The close attachment of the mucous membrane to the muscular wall at the anterior commissure of the rectum requires some dissection to loosen it, but this is never difficult. The wound is sutured with large-sized catgut in continuous sutures running from the posterior to the

anterior commissure upon each side (Fig. 215). The large-sized catgut is of importance because it is less likely to tear through than fine silk or small suturing material. Chromicized gut and silk are objectionable, in that they both remain in the parts too long; they require to be removed or must cut their way out, leaving small fissure-like cracks about the margin of the anus, and sometimes they cause little stitch-hole abscesses which are very annoying and retard recovery. In 107 operations by this method the result has been simply perfect in 105; the catheter has been used in only 2 cases, and morphia has been administered only three times in the entire series. In 1 case, through a mistake of the house surgeon, an unfortunate result occurred. Not being present at the operation he supposed that the clamp and cautery had been employed, and noticing a somewhat unusual oozing from the parts, determined to pack the rectum and control it. Without introducing a speculum, he forced a large mass of iodoform gauze through the anus and thus tore loose all of the sutures and forced the mucous membrane upward into the rectum. This was done about two hours after the operation, and an alarming secondary hæmorrhage occurred. The author was called to the patient, and on learning what had taken place immediately reanæsthetized him, washed out the parts as well as possible, and applied the sutures for the second time. As might have been expected, primary union failed to occur, and a cicatricial stricture resulted which required the use of bougies for a year afterward in order to prevent most serious contraction. In the other case a result occurred which is inexplicable; the operation was performed as above described, primary union took place, and the patient reported himself as having no discomfort and feeling perfectly well for three months thereafter. He disappeared from view, and at the end of six months he was recommitted to the workhouse where he had been treated. Upon examination of the rectum a cicatricial stricture of marked character was found about 2 inches above the anal margin. The dissection did not extend to any such height; the anus and the rectum at the site of the suture were patulous and of normal caliber;



FIG. 215.—MODIFIED WHITEHEAD OPERATION COMPLETED.

the patient had no specific history or other evidence of syphilis, and therefore the condition could not be attributed to it. The author is unable to explain it.

The design of this operation has in it no originality; it is simply a short method of accomplishing what Whitehead advocated. The time occupied in the operation varies from ten to fifteen minutes, which is a matter of no inconsiderable importance, inasmuch as a large number of the operations mentioned have been done upon patients above the age of sixty years. In a number of cases the wound failed to heal at all points by primary union, and small granulating spots were left, but these healed in due time, and there was no appreciable retraction of the mucous membrane. When large skin-tabs are present they are cut off with scissors and the edges are sutured together; or they are crushed off with the clamp and collodion is applied, as before described, after the operation on internal hæmorrhoids has been completed. In none of these cases has there been any incontinence or loss of sensibility in the rectum.

Instead of removing the entire pile-bearing area or lower inch of the mucous membrane of the rectum, as is done in the Whitehead operation, many operators prefer to take the pile tumors individually, excise them and suture the edges of the mucous membrane together. Gallant (*Matthews Medical Quarterly*, October, 1894) states that Outerbridge had followed this plan since 1888 with great success. The author has applied this method a number of times; he has not observed that it shortened the course of treatment or gave any less pain to the patient than the clamp-and-cautery operation; moreover, it requires considerable more time than the latter operation, and may, as he has seen in one case, be followed by stricture of the rectum.

Earle (*Matthews Medical Quarterly*, January, 1896), Parkhill (*International Journal of Surgery*, May, 1900), and Mason have each devised instruments for this operation and also to facilitate the Whitehead method; the author's experience is confined to the Earle instrument.

Earle's Method.—The patient is prepared for the operation as in the other methods; the sphincter is stretched and the parts thoroughly cleansed. If the hæmorrhoidal tumors are isolated, each is seized, in order, with the hæmorrhoidal forceps, dragged down and then grasped in the line of the long axis of the gut by the Earle clamp (Fig. 216); a running suture is then introduced through the fold of mucous membrane just above the grasp of the clamp and tied around this fold, thus including the artery supplying the pile; the free portion of the hæmorrhoid is then cut off little by little, and the running suture is carried round and round the clamp (Fig. 217) through the base of the tumor until

the lower end of the hæmorrhoid is reached; the clamp is then loosened and withdrawn, the running suture is tightened and tied, and the whole wound is thus closed without any loss of blood. If the whole circumfer-

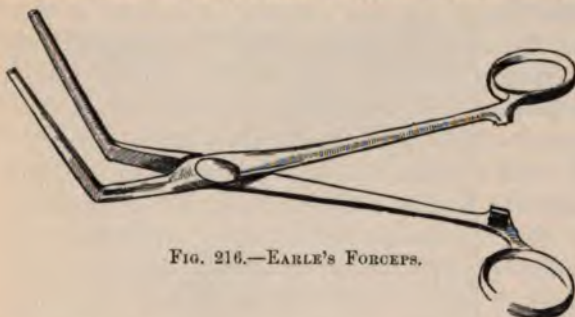


FIG. 216.—EARLE'S FORCEPS.

ence of the rectum is involved in the hæmorrhoidal process the method is modified as follows:

The tissues are seized at four or five points in the circumference of the anus at the level of

Hilton's white line and dragged down until the healthy mucous membrane is brought into view; an incision is then made through the mucous membrane at the posterior commissure to the height of the tis-

sues to be removed. The mucous membrane at the upper angle of this incision and the skin at the lower angle are brought together with a large-sized cat-gut suture. The hæmorrhoidal clamp is then placed upon the tissues to be removed parallel with the circumference of the anus, and the summit of the tumor is excised and the wound sutured as in the case of the isolated tumors, "thus imitating the work done by the Whitehead operation in almost a bloodless manner, without exposing the raw surface to infection." Earle recommends the use of Hibbs' double curved scissors to excise the tumor, and has recently stated that Hibbs' modification of his forceps is more suitable for the second method of operating. As in



FIG. 217.—EARLE'S OPERATION.

the Whitehead operation, large plain catgut is recommended for the sutures.

The author has occasionally found some difficulty in pulling the loops of thread tight after the forceps has been removed on account of their sinking into the tissues. To avoid this he has added to the Earle forceps a small hook (Fig. 218), over which each loop of the suture is thrown until all are placed in position. By this means the suture can be accurately and surely tightened without undue dragging upon the wound.

In cases with one or two pedunculated hæmorrhoids and relaxed sphincters, this operation can be done under the influence of cocaine in one's office, and the patient allowed to go home and about his business on the following day. The operation is not altogether applicable to those cases in which there is a general varicosity of the entire

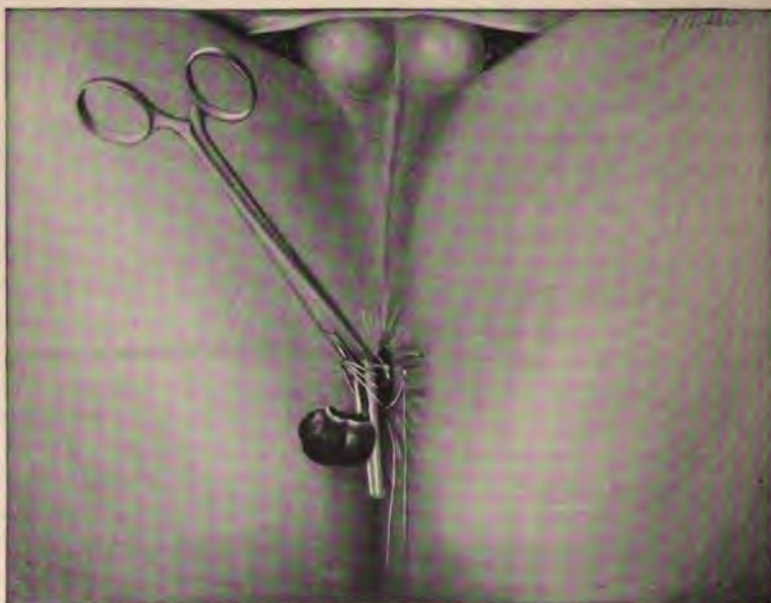


FIG. 218.—LIMITED EXCISION OF HÆMORRHOIDS.

rectum. In properly selected cases, however, the results obtained by it have been all that could be desired.

From a surgical point of view excision is certainly an attractive operation, but it is not so simple as the ligature or the clamp and cautery. The pain and dangers of hæmorrhage, either primary or secondary, can not be considered as serious objections; the complications and dangers from the operation consist in failure of primary

union, the destruction of sensitive organs of the lower end of the rectum, and in the production of circular stricture at the anus. The writer has seen seven strictures caused by this operation, and has come to the con-

clusion that it is not a safe one in the hands of general practitioners, however successful it may be in those of an expert, rapid operator. Two other complications have been observed which can not properly be charged against the method. The first was an exstrophy of the rectum due to the incision having been made in the skin outside of the anus, and the mucous membrane (Fig. 219) sutured to its edges. Through this faulty technique the membrane is exposed to constant friction from the clothing and from the buttocks in walking, the surrounding skin is moist and excoriated, and there is a disgusting feculent odor from the



FIG. 219.—EXSTROPHY OF MUCOUS MEMBRANE FOLLOWING FAULTY WHITEHEAD OPERATION.

parts. This complication may be remedied as follows:

A star-shaped incision is made in the skin around the anus; the points and the protruding mucous membrane are dissected loose, the latter is shoved up to its natural position and fixed there by buried sutures; finally the skin edges are sutured together, and a Pennington tube inserted. The other deplorable result was exactly the opposite to this, in that the mucous membrane had not been dissected sufficiently high up, the skin had been loosened around the lower edge of the incision, and when the parts had united the cutaneous tissue was dragged upward into the rectum, where it was kept moist by the mucous secretion, and a sort of sodden, washer-woman's-hand condition of the skin was produced, which soon became excoriated, and discharged a feculent secretion which burned, stung, and irritated the patient until life was almost unbearable. The author has operated upon 2 cases for this complication by dissecting the skin and

mucous membrane loose and cutting off that portion which was drawn upward into the rectum, afterward bringing the normal mucous membrane down and suturing it to the healthy skin about the margin of the anus. The results have been an improvement in the patient's condition, but not altogether satisfactory.

The American Operation.—There has been a great deal of confusion with regard to the use of this term. Some authors apply it to the transfixion method of ligature. In the western part of the United States it is understood to mean a modification of the Whitehead operation introduced by Pratt, of Chicago. This procedure differs from the ordinary Whitehead operation in two features: first, the mucous membrane is cut transversely above the hæmorrhoids and dissected downward; second, it premeditatedly removes all the redundant skin and muco-cutaneous tissue around the margin of the anus. The operation thus done drags the internal sphincter downward, forming a collar or roll around the lower end of the rectum, and it also brings the mucous membrane outside of the anus, producing a sort of exstrophy ani. The whole procedure is a bad modification of the Whitehead operation; it does not represent the opinion or practice of American surgeons, and is in no wise entitled to this name.

The injection method might very properly be called the American method, for it originated in this country. Roux, of Lausanne, speaks of it as such. He describes it, however, as a major operation done under anæsthesia and after forcible divulsion of the sphincters. The particular features of the operation as done in America are: it requires no anæsthetics, it gives little pain, and does not confine the patient after the first few hours. Were the method always as carefully and thoroughly carried out with regard to its antiseptic details as is described by Roux, this operation would be a credit to America or any other country. It is certainly more entitled to the appellation than is that parody on excision described above and so often called the *American operation*.

STRANGULATED HÆMORRHOIDS.—Strangulation of hæmorrhoids may occur in two ways: first, by the prolapsed mass being grasped by a spasmodic sphincter which constricts the circulation; second, by an inflammatory action set up through abrasion and infection of the mucous membrane of the rectum, through which the vessels of the hæmorrhoidal tumor are obstructed. The distinction between these two causes is very important, as in one we are able by dilatation of the sphincter to relieve the strangulation, while the other, being due to an inflammatory process, must be treated upon an entirely different basis. In the first method it may occur as an acute condition in patients whose piles have never prolapsed before, but have been brought down

at the time by unusual straining, in lifting, or in the efforts to have a movement of the bowels. Again, the hæmorrhoids may have been in the habit of prolapsing for years. At first, perhaps, they are spontaneously reduced; later on the patient finds it necessary to reduce them himself; but finally, after a period of constipation, or some irritation at the margin of the anus, the sphincter becomes spasmodic, the tumors are constricted by it, and strangulation ensues. Strangulation occurs in only internal and mixed hæmorrhoids (Fig. 220); in the former it is not very painful, and sometimes proceeds to gangrene before the patient realizes there is any serious disturbance; in the mixed variety it is very painful. Efforts at reduction in the latter cases should be very carefully made, because only a part of the swollen and constricted mass can be put inside of the rectum, and any attempt to put the rest above the external sphincter will not only be useless, but will aggravate the condition. Where the strangulation has persisted for some time, the tumors may slough off. In this way spontaneous cure may result, but generally it is very in-



FIG. 220.—STRANGULATED HÆMORRHOIDS.

complete, because only portions of the mass slough away, and little, irritable, bleeding stumps remain which are the source of much annoyance, and sometimes of considerable hæmorrhage. This result may occur just as well in cases of inflammatory strangulation as in those due to constriction of the sphincter muscles. The author does not agree with the authorities who hold that if sloughing has once commenced in a hæmorrhoid nothing more is to be done except to place a charcoal poultice on the parts and let the gangrene proceed; the best results are obtained in these cases by immediate radical operation at the very earliest possible time after strangulation has occurred, whether there be gangrene or

not. When the sloughing is incomplete, the patient must suffer more or less pain and danger from hæmorrhage while the process is going on. It seems, therefore, that it is much wiser to anæsthetize the patient, stretch the sphincter, and remove all the gangrenous and septic material. One may say that cutting away the gangrenous material only opens the way to septic infection. This would be true, perhaps, if the incisions were made with sharp instruments, but when made with a clamp and the stump cauterized, all absorbent vessels are hermetically sealed, and little or no possibility of septic absorption remains. There may be some excuse for not operating upon a strangulated hæmorrhoid when it is simply congested and inflamed, and can be reduced by proper manipulation; but there is none whatever for leaving a mass of rotten, gangrenous tumors to macerate and drop away when they can be radically and safely removed by surgical operation. Hæmorrhoids which prolapse may become turgid and swollen, and yet not strangulated (Plate IV, Fig. 4). In such a case, if operation is not possible at the time, the patient should be placed with his hips elevated, compresses soaked in hot water or boroglyceride should be applied to the parts, and a hot-water bag laid over these to maintain the heat, encourage the circulation, and prevent sloughing. Cold applications are inadvisable in such cases.

Patients consent much more readily to have an operation for piles when they are suffering pain and distress from prolapse or strangulation than at other times. In fact, many who have persistently refused to have anything done so long as their hæmorrhoids were in a quiescent state, eagerly seek operative relief when these conditions develop.

Febrile and constitutional symptoms are associated with both varieties of strangulation, but they are more marked in the inflammatory than in the muscular; the pain is also greater in the inflammatory kind. Strangulation may be due to inflammation, and yet at the same time complicated by constriction of the sphincter muscles. In these cases the inflammation occurs first, the hæmorrhoids become swollen, strangulated, and prolapsed, and then the irritation causes spasm of the sphincter, and thus there is a double condition to deal with. If seen before ulceration or gangrene begin, almost any mass of prolapsed hæmorrhoids can be reduced under the influence of general anæsthesia. If, however, the patient must be anæsthetized in order to have the tumors reduced, there are scarcely any circumstances which would contraindicate the radical and rapid removal of the mass. The application of cocaine or suprarenal extract will sometimes contract the tumors so that they can be reduced without general anæsthesia.

ACCIDENTS AND COMPLICATIONS FOLLOWING OPERATIONS FOR HÆMORRHOIDS.—Certain accidents and complications are liable to follow all

operative methods for hæmorrhoids. They are more frequent in some than in others, but practically of the same nature in all.

Pain.—There is a wide variation in the statements of different authors regarding the pain following one operation or another. Allingham, Mathews, Goodsall, and Bacon state that after the ligature the pain is very slight and of short duration. A careful inquiry from the internes in ten large hospitals, instituted some five years ago, established the fact that, in these institutions at least, patients having undergone operation by ligature require four times as much morphine as those operated upon by the clamp and cautery or the Whitehead operation. There seems to be little difference in this respect whether the Allingham, Bodenhamer, or Mathews operation is employed. Where a deep groove is cut entirely through the skin and muco-cutaneous tissue, and the ligature fits accurately into it, the pain is less than where these tissues are tied with the pile; unless this is done, the operation can not be said to have been properly performed. Notwithstanding this precaution, the ligature operation always occasions a great deal of pain. The clamp-and-cautery method, if properly done, is followed by considerably less pain than the ligature; nevertheless, there are cases in which it produces great suffering, and it is sometimes difficult to determine the cause thereof. It is not due in either operation to spasm of the sphincter, otherwise restretching of this muscle would relieve it, and it does not do so. The most probable explanation of the excessive pain which some patients suffer after either the ligature or the clamp and cautery lies in the supposition that some nerve-end is caught in the ligature or in the charred surface. The personal element, however, must be reckoned with in every operation; some patients will bear without complaining what others describe as intolerable agony. As a rule, there is not a great deal of pain following the clamp-and-cautery operation after the first twenty-four hours, and if the parts are dressed with anæsthesin there will be very little even during this period. It is a rare thing for cases operated on by this method to require more than one hypodermic injection of morphine.

Following the method of excision the pain is very great for eight or ten hours; after this it subsides, and, unless there is some other complication, it practically ceases. Morphine is the best remedy to control it after all operations, but occasionally large doses of bromide of soda will act more satisfactorily in cases of extreme nervous irritability. The smarting pain which follows a movement of the bowels in either operation may be relieved by the application of pure iodoform, a 10-per-cent ichthyol ointment, or the insufflation of orthoform just before the stool.

Dysuria.—Strangury and dysuria are almost inseparable from the

ligature operation. The writer does not remember a single case where this method was used in which it was not necessary to catheterize the patient for some days or even weeks afterward. This is sometimes necessary after the clamp-and-cautery and excision methods, but not nearly as frequently so as after the ligature. The closer the rectum is packed the more likely catheterization will have to be employed. One should not be in too great a hurry, however, in drawing off the urine, for sometimes hot applications over the pubis and allowing the patient to stand on his feet will enable us to obtain voluntary urination. Unless there is great distress it is best to allow the patient to go for eight, twelve, or even sixteen hours before resorting to the catheter. Either a sterilized, soft-rubber, or Van Buren silver instrument should be used for this purpose; woven instruments with sharp ends are very objectionable. The urethra should be washed out with boric-acid solutions before any instrument is introduced.

Period of Confinement.—According to the most enthusiastic advocates of the ligature operation, the patient must be confined to his room for two or three weeks, and be kept quiet in bed from seven to fourteen days, until the ligatures come away; the period at which this happens is very indefinite; it varies from five to thirty-five days, as the writer saw in one case in 1899. It is therefore impossible to tell with any degree of certainty how long a patient will be confined by this method. Some surgeons allow their patients to get up and go about before the ligatures come away, but this is dangerous and should not be done.

After the clamp-and-cautery operation the patient is only confined to his bed for the first three days, after which time he is allowed to walk around the room, and generally returns to his business in seven days from the time of the operation, although the parts are rarely completely healed under three weeks. The time consumed in healing over the granulating surfaces is on an average about one week less by this method than by the ligature.

Following the methods of excision the patient must be confined to bed for seven or eight days. If primary union has then taken place, the parts will be completely united and practically well, but if failure in union has occurred at any point in the circumference, the patient should be kept quiet until the granulated spot has healed. In this respect, therefore, the clamp and cautery has the advantage over all other operations, in that there is no necessity for the patient to lie in bed after the first seventy-two hours.

Secondary Hæmorrhage.—The danger of secondary hæmorrhage is greatly exaggerated by quacks and charlatans who do not operate for hæmorrhoids. If a blood-vessel is thoroughly tied off, crushed, or

cauterized, there is very little danger of hæmorrhage from it. If a ligature should slip within the first few hours after operation, bleeding may occur, but such an accident is so rare that one need hardly consider it as a serious complication. Thorough packing of the rectum with gauze will check it in any case. If one has at hand a conical sponge, such as is used by Allingham, and will introduce it into the ampulla through a tube, and then drag down upon it by the cord run through its center, the bleeding may be quickly stopped. The gauze, however, is always at hand, is more easily sterilized, and more likely to produce general compression than the sponge. The introduction of astringents, other than cold or very hot water, is absolutely unnecessary, and is injurious in these cases; perchloride of iron not only irritates the parts but it forms a hard, brittle clot which may break off when the dressing is removed and thus cause the bleeding to recur.

Where these methods do not check the hæmorrhage in a very short time, the operator should not hesitate to reanæsthetize the patient, stretch the parts open, and tie the bleeding vessels. In the very many cases operated upon by the clamp-and-cautery method the writer has seen only one hæmorrhage, and this was due to the fact that he allowed the stump to slip out of the clamp before it was cauterized; this accident occurred through not running down the screw which holds the clamp together, and since that time this little precaution has never been neglected. In this case the crushing by the clamp controlled the bleeding for the time being, but the pulsation of the artery overcame this obstruction and a concealed hæmorrhage occurred which nearly cost the patient his life. It should be distinctly stated that this accident was due to an error of the operator and not to the operation.

In the excision method the primary bleeding is considerable, but secondary hæmorrhage is almost unknown. The case related above, where the sutures were all torn loose and the cuff of mucous membrane turned up into the rectum through a misapprehension on the part of the house surgeon, can not be charged to the operation. If the operations are properly done there is practically no danger whatever from secondary hæmorrhage.

Erysipelas, Tetanus, and Infection.—Erysipelas may occur in any of the operations for hæmorrhoids owing to infection by streptococcus, but it is a most unusual occurrence. It is less likely to follow the clamp and cautery simply because the hot iron not only kills the germs and bacteria about the parts at the time, but it also seals the mouths of the blood-vessels and lymphatics in the stump, thus preventing infection through these channels. It should be prevented by proper antiseptic precautions, but if it does develop, Credé's ointment is almost a specific for it.

Tetanus has frequently followed the ligature operation. Almost every fatal termination in operations for hæmorrhoids has been due to this disease, and in every one of them the operation has been by the ligature method. Whether this is a coincidence or is due to the fact that the absorbent silk ligature attracts and retains in its meshes small particles of faecal matter containing the bacillus, thus keeping them in close contact with the parts, can not be determined. As a matter of fact, however, no case of the disease has yet been reported as following operations by the clamp-and-cautery or excision methods.

The treatment for this condition is laid down in works on general surgery. Recently some cases have recovered under serum therapy, but, so far as the writer knows, no case developing from a rectal operation has ever been cured.

Abscess and Fistula.—These conditions have been known to follow operations by the ligature, by the clamp and cautery, and by the excision methods; they do not result from the operations themselves, but from traumatism produced by stretching the sphincter. The operations are usually done in non-suppurating cases, and, the sphincter being thoroughly stretched, there is no reason why the complete drainage thus obtained should not prevent any burrowing and abscess formation from the wound in the rectum.

If, however, some small perirectal blood-vessel should be ruptured and a hæmatoma formed in the cellular tissue, this may necrose or become infected and cause perirectal abscess. The writer has opened three abscesses of this kind, and evacuated quantities of sero-pus and broken-down clots, which appear to prove that they originated in perirectal hæmorrhages. Two of these abscesses followed the ligature method, and one the clamp and cautery. The only treatment in these cases is to open and drain as soon as the perirectal swelling is discovered.

After the methods of excision small stitch-hole or burrowing abscesses may occur, but they should not attain any great size. As soon as the evidences of such appear, the surgeon should cut the stitches at this point at once, and thus drain it. The writer has done this in two instances, and in each case has obtained primary union, with the exception of the small area which was opened to drain the abscess. It is a complication above all others which makes careful watching and daily examination of the patients having undergone operations for hæmorrhoids important. The first quickening of the pulse or rise of temperature after the twenty-four hours following operations should excite suspicion and suggest immediate and thorough examination of the parts.

Stricture.—Stricture has been frequently spoken of as the result of all operations for hæmorrhoids. Allingham states that following

the ligature operation it is due to tying off of too large masses of mucous membrane in one ligature, and shows in his drawings that by this method a large raw surface is left partially surrounding the rectum. He does not think, however, that the stricture is due to cicatricial contraction from the large granulating area, but that it is caused by the massing together of folds of mucous membrane which causes adhesions that do not readily give way, an explanation that is very plausible. He also attributes these strictures to patients getting up before the wounds are healed, and in order to avoid them, advises the daily passage of the finger or a moderate-sized bougie into the rectum until the wound is completely healed over.

Following the clamp-and-cautery operation, stricture is certainly one of the rarest complications. If the hæmorrhoid is caught in the line of the long axis of the gut it will never occur, but if it is caught transversely so that the cicatrix runs around the lower end of the rectum, contraction may result. Smith and Kelsey, after operating upon thousands of cases by this method, have failed to see a single case of stricture following it. The author has seen only one.

After the Whitehead operation, however, stricture is likely to occur even when primary union is obtained. There must be a circular cicatrix at the line of union, and if there is a deposit of fibrous tissue beneath this, contraction will take place. This may be caused by too deep dissection or not loosening the mucous membrane high enough up, so that when it is drawn down it produces a sort of roll or tuck in the walls of the gut, which narrows the caliber, and becoming matted together by inflammatory processes forms a true stricture.

A large number of strictures of the anus are seen to-day as the result of this operation. While the writer has only seen 2 in over 200 operations in his own practice, he has seen 7 in cases where the Whitehead operation was said to have been done by other surgeons. This complication is much less likely to follow the ligature or clamp and cautery than the Whitehead operation.

Ulceration and Fissure.—Protracted ulceration or chronic fissures have been known to follow the Whitehead, clamp-and-cautery, and ligature operations. While Mathews is honest when he says that he has never seen an unfortunate result follow the ligature method, the author has seen 1 patient upon whom this eminent surgeon operated, and who is still suffering, after nearly three years, with chronic ulceration at the posterior commissure of the rectum, together with a slight contraction in the caliber of the gut. In 10 patients under the writer's care, the ulceration following this operation has persisted from three months to two years; such a result is rare in comparison with the number operated on, but it occurs more frequently after the ligature than after the

clamp-and-cautery or excision methods. The constitutional condition of the patient will account for this in the majority of cases, and in those cases in which it has occurred, it might have done so had any other method been used.

In summing up the accidents and complications following operations for hæmorrhoids, it is fair to say that untoward results occur occasionally in all of them, but they are less frequent and less severe after the clamp and cautery than after any other method.

Recapitulation.—After this prolonged discussion one may be somewhat confused as to the method to be used in an individual case. Experience only can teach this. In the early stages of the disease the *palliative treatment* will always relieve, frequently results in permanent cure, and ought to be given a trial. In uncomplicated varicose internal hæmorrhoids, with relaxed sphincters, the *injection method* is comparatively safe, and its results are very satisfactory in the majority of instances. In strangulated, mixed, and ulcerating piles, or those with considerable connective tissue in their substance, the *clamp and cautery* is by far the best method. In hæmorrhagic cases, or those with atheromatous arteries, the *ligature* is probably the safest method. In cases with only one or two marked hæmorrhoids, partial excision by the aid of Earle's clamp appears to be an ideal operation. Where there is a general varicosity of the lower end of the rectum, with prolapse of the mucous membrane, *excision with immediate suture* will give the best results. On account of its applicability to all varieties, the ease and celerity with which it can be applied, and its uniformly good results, the *clamp and cautery* easily stands first among the operations for hæmorrhoids.

CHAPTER XVII

PROLAPSE OF THE RECTUM, PROCIDENTIA INTESTINI RECTI

PROLAPSUS and *procidentia*, both of Latin derivation, are identical in their meaning, and signify a falling down. Some authorities have attempted to establish a distinction between the two, limiting the term prolapsus to a descent of mucous membrane, and procidentia to those conditions in which all the coats of the gut come down. Allingham (*Diseases of the Rectum*, 1896, p. 209) goes further than this, and says: "By prolapse is meant a protrusion outside the anus of a portion or portions of the mucous membrane, not in its entire circumference and unaffected by piles. The term procidentia must be confined to a descent of the whole circumference of the rectum." This limitation of the term prolapsus is entirely too restricted, and there is no authority for it in etymology or literature. Cases occur in which the mucous membrane prolapses in its entire circumference with one or two hæmorrhoids at different points, and yet these would be excluded under the definition of this gifted surgeon. Prolapsus has been applied for centuries to all degrees of falling of the rectum, and it is too late to put such a restriction on its use. It is the generic term, and applicable to all types of the condition, and will be so used in this work. Procidentia, however, has not been so generally employed, and is practically always applied to those cases in which all the coats of the bowel descend. It will be so used here. It is not so important that the prolapse does or does not involve the entire circumference of the gut, as it is that it involves only a part or the whole of its thickness. Prolapsus is divided into *incomplete* or *partial prolapse*, in which the mucous membrane alone descends; and *complete prolapse* or *procidentia recti*, in which all the coats of the bowel—the mucous, submucous, muscular, and even the peritoneal—take part. According to this division the term *prolapse* may signify any form or degree of descent, while *procidentia* applies only to the different degrees of complete prolapsus.

Incomplete Prolapse.—This variety, called also *partial prolapse* by Cripps (*op. cit.*, p. 120), consists in a sagging down, or protrusion from

the anus, of the mucous membrane of the rectum (Fig. 221). It is an exaggeration of the normal physiological eversion which occurs at every stool. In health the loose fibrous and elastic tissues allow a certain amount of protrusion of the membrane which facilitates the ejection of the faecal mass, and when the act of defecation is completed retract it by their elasticity. In pathological conditions these tissues become stretched and permanently elongated; they lose their elasticity, and thus



FIG. 221.—INCOMPLETE PROLAPSE OF THE RECTUM.

not only allow the mucous membrane to extrude to an abnormal degree, but fail to draw it up again.

This is the most frequent form of prolapse, and occurs constantly in acute proctitis with œdema, in hæmorrhoids, and in superficial neoplasms of the rectum.

Etiology.—Age.—

The disease is found most frequently in young children and in the very old. In adults it is not at all frequent, but occasionally occurs in women who have suffered from complete rupture of the perinæum or after prolonged, exhausting diseases. Those states in which there is relaxation of the sphincter muscles and reduction of the fatty cushions which surround the lower end of the rectum and anus are all predisposing causes.

The exciting causes are:

1. Whatever separates the mucous from the muscular wall of the gut, such as œdema or inflammatory effusion into the submucosa. Molière (*op. cit.*, p. 199) proved this, and produced the disease artificially by introducing a blow-pipe beneath the mucous membrane and insufflating air into the submucous tissue, thus separating the mucous from the muscular wall of the gut, and causing the former to extrude from the anus.

2. Those conditions which produce weakness or dilatation of the sphincter muscles, such as exhausting diseases, paralysis, incisions, over-distention, sodomy, and traumatic injuries to the sacral plexus of nerves.

3. Whatever mechanically drags down upon the mucous membrane—i. e., hæmorrhoids, tumors attached to the membrane, polyps, and hard costive stools.

4. All those diseases and conditions which produce increased peristalsis and straining efforts at stool, such as pinworms, foreign bodies in the rectum, ulcerations, proctitis, urethritis, stricture of the urethra, cystitis, stone, phimosis, and enlarged prostate.

5. Prolonged sitting and efforts at defecation. The pernicious habit of seating little children on vessels and compelling them to sit there until the bowels move is one of the most frequent causes. Old men of leisure, who are accustomed to take their pipe and morning paper to the toilet with them, often suffer from this form of the disease.

6. Diarrhœa, especially the summer diarrhœa of children, dysentery, and cholera morbus, with excessive vomiting, may all bring about this condition.

Symptoms.—The symptoms of incomplete prolapse are at first very meager. The condition never comes on suddenly, and in the beginning is not accompanied by pain, itching, or discharge of any kind. There is simply an exaggeration in the normal protrusion of the mucous membrane at the time of stool. This gradually increases until it becomes perceptible and annoying. The extent of the incomplete prolapse is limited by the distensibility of the fibrous attachment between the mucous membrane and the muscular walls. One to $2\frac{1}{2}$ inches may be said to represent the possible extent of such a prolapse.

At first the prolapse is spontaneously reduced or recedes under gentle pressure, but as it increases and the membrane grows thicker through inflammatory changes, it is grasped more or less firmly by the sphincter muscle, and reduction becomes more difficult. In this type of the disease, however, strangulation of the prolapsed gut and sloughing, such as takes place in the complete variety, are rarely seen.

The color of the prolapse is at first like that of the normal mucous membrane. It gradually assumes a bright-red or scarlet as the irritation from sliding up and down increases, and when constricted by the sphincter it may assume a dark-purplish or gangrenous hue.

The prolapse may involve the entire circumference of the anus or only a part of it. When it involves the entire circumference, it will be composed of longitudinal folds which radiate from the center to the circumference. This direction of the folds or sulci distinguishes the incomplete from the complete form of prolapsus. The surface of the protrusion may be smooth or lobulated according to the inflammatory, hæmorrhoidal, or neoplastic conditions complicating it. Excessive hæmorrhoidal disease is always associated with more or less prolapse of the mucous membrane, and in these cases we observe the three or four cardinal tumors with a sagging down of the mucous membrane of the rectum between them. Pain, hæmorrhage, ulceration, and suppuration occur later in the disease as the result of friction due to the slipping up

and down of the prolapsing membrane, to constriction by the sphincter muscle, or irritation by the passage of hard faecal masses. These symptoms, however, are secondary complications of the disease and not a part of it.

Treatment.—The treatment of this type of prolapse is very simple. The removal of the cause, where it is apparent, is always the first step. Hæmorrhoids, polypi, and other neoplasms should be excised, and the operations accomplishing this will ordinarily result in the cure of incomplete prolapsus.

In children and old people the habit of prolonged sitting at stool should be discontinued. A cold enema should be administered just before going to the toilet in order that defecation may be accomplished promptly and with ease. Such reflex causes as phimosis, stone, urethral stricture, etc., should be eliminated before attempting any operative treatment for this condition. In children a very large majority of these cases can be cured without any surgical operation. Active tonic treatment, careful attention to the movement of the bowels, cold applications and electricity to the anus, and plenty of fresh air will generally accomplish a cure.

In elderly people, however, the organic changes in the fibrous attachment of the mucous membrane are not so easily overcome, and operation is very frequently called for.

The operative methods employed in this type of disease consist in cauterization of the mucous membrane, and in partial or complete excision. Allingham advises cauterizing the entire surface of the prolapse with fuming nitric acid, and believes that this will set up an inflammatory condition of the submucosa which will shorten the fibrous connections between it and the muscular wall, thus overcoming the prolapse. The method of Van Buren is based upon a similar view, and consists in cauterizing the prolapse with the actual cautery, heated to a red heat, in lines about $\frac{1}{2}$ inch apart throughout its entire extent.

It is difficult to understand how either one of these methods acts through producing a submucous inflammatory condition, for whatever increases the separation between the mucous membrane and the muscular wall tends to produce prolapsus. It does not seem to the writer, therefore, that the method of repair follows the course laid down by these eminent authors; the results are more probably due to the spasmodic contraction of the sphincter and the prolonged constipation produced by these cauterizations, together with the actual narrowing of the lower end of the intestinal canal. If the prolapse is overcome by the production of submucous inflammation between the mucous membrane of the rectal wall, the same can be set up by hypodermic injections of chemical sub-

stances into this space without the necessity of ulceration and inflammation in the mucous membrane itself. Occasionally this condition has been cured by such methods, and the author would certainly advise their application before any attempts at cauterization by the Allingham or Van Buren methods.

The injection treatment of incomplete prolapse consists in the introduction of 3 to 5 minims of modified Shuford's solution into the sub-mucous tissue at several points around the circumference of the anus. After this injection has been completed, a rubber drainage-tube should be introduced into the rectum, and the rectal ampulla packed thoroughly with gauze so as to hold the gut in position. The drainage-tube will serve for the escape of gases, and the bowels should be confined for seven to ten days. A firm compress should be kept over the anus at first in order to prevent the mucous membrane from coming down, and the patient should be kept under the influence of opiates sufficiently to control peristalsis and efforts to expel the rectal packing. If carefully performed with proper antiseptic precautions, there is no danger of suppuration or sloughing in this method, and the percentage of cures is fully equal to that by the cauterizing methods mentioned above.

The radical and certain cure of these conditions, however, consists in partial or complete excision of the prolapsing mucous membrane. Partial excision consists in taking out elliptical portions of the mucous membrane at three or four points around the circumference of the prolapse. This may be done in two ways: first, by excising the mucous membrane with scissors and suturing the edges of the wound together; secondly, by grasping strips of the membrane in the hæmorrhoidal clamp, and removing them just as one would a hæmorrhoidal tumor. The latter method is far simpler, and accomplishes just as good results, for in the large majority of cases the sutured wounds do not heal by primary union, and in the end we have to deal with a granulating wound such as follows the operation by the clamp and cautery. In applying the clamp and cautery to this condition, one should always observe the same rules as are laid down in the operation for hæmorrhoids, viz., that the muco-cutaneous tissue should never be embraced in the part cauterized, and the long axis of the portion removed should be parallel with that of the rectum. This method, employed entirely by Henry Smith, gives uniformly good results, and can be performed by any surgeon.

The method of complete excision of the prolapsing mucous membrane consists in nothing more nor less than a Whitehead operation. This has already been described in the chapter upon hæmorrhoids. The only precautions necessary to be repeated here are, first, the necessity of care-

ful antiseptic preparation and technique, of keeping the incision entirely within the mucous membrane, and the importance of careful adjustment of the edges of the wound so as to avoid tension and tearing through of the sutures.

The same objections may be urged against the operation in prolapsus as have been urged under the subject of hæmorrhoids. The non-operative and the clamp-and-cautery methods laid down above will prove the most

satisfactory treatment in a large majority of the cases. In this minor degree of prolapsus the writer has not found any advantage from strapping the buttocks together or requiring the patient to lie in the recumbent posture when his bowels move. The mucous membrane will prolapse in this position just as much as if the patient sits upon the commode.

The ligature operation in the treatment of this condition, although it is advised by Mathews, Allingham, and other operators, is not so satisfactory as the clamp and cautery, although it will cure those cases which are due to hypertrophied hæmorrhoids.

COMPLETE PROLAPSE, PROCIDENTIA INTESTINI RECTI.—

There are three degrees



FIG. 222.—COMPLETE PROCIDENTIA RECTI—FIRST DEGREE.

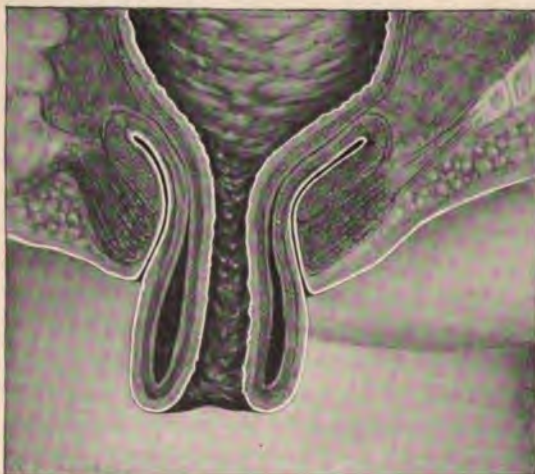


FIG. 223.—COMPLETE PROCIDENTIA RECTI—SECOND DEGREE.

of complete prolapse of the rectum, all of which involve a descent of the rectum in all its coats to a greater or less extent. They are distinguished as follows:

First Degree: *In this the prolapse begins at the margin of the anus, and its external surface is continuous with the skin surrounding this aperture (Fig. 222).*

Second Degree: *The prolapse begins at a point more or less above the anus, and, descending through that portion of the gut which remains in position, protrudes through the anal orifice (Fig. 223).*

Third Degree: *The prolapse begins high up in the rectum or sigmoid flexure and extends down into the ampulla of the rectum, but does not protrude through the anal orifice (Fig. 224).*

These three degrees vary considerably in their symptoms and treatment, and therefore merit separate consideration.

The First Degree.

—This variety of procidentia is brought about by the same causes as incomplete prolapsus; it is frequently a sequence of the latter. Partial prolapse can only extend to a limited degree before the fibrous attachment of the mucous membrane to the muscular wall begins to drag forcibly upon the latter, and eventually carries it down-

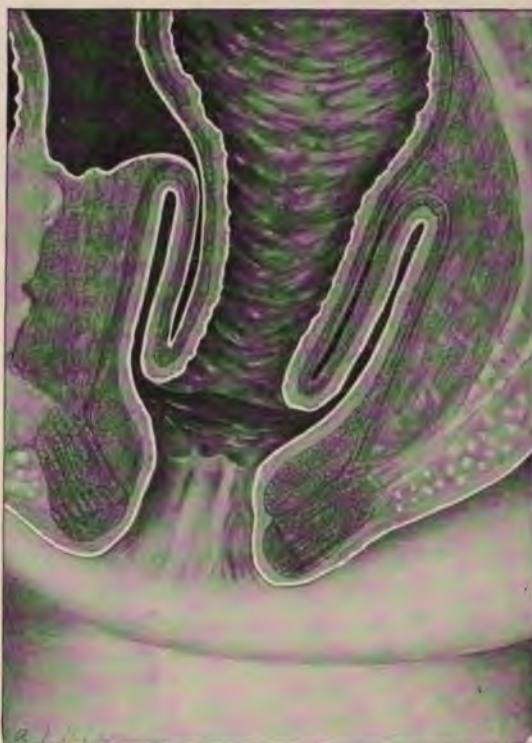


FIG. 224.—COMPLETE PROCIDENTIA RECTI—THIRD DEGREE.

ward, thus bringing about a complete prolapse of the first degree. This form, however, rarely occurs in connection with hæmorrhoids, owing to the fact that these growths are situated at a very short distance above the muco-cutaneous margin and only drag the mucous membrane down to that limited extent that will be permitted by the stretching of the elastic bands in the submucosa. When the attachment of the neoplasm which causes a prolapse reaches the lowest point of the latter, it then drags upon the external attachment around the margin of the anus as well as upon the mucous membrane of the gut above, and consequently

the prolapse can not proceed any farther. Therefore, as the hæmorrhoids are attached low down in the rectum, prolapse from this cause can never be excessive. When, however, the condition is due to polypi or neoplasms higher up in the rectum, the organ may be dragged outside of the rectum to the extent of the height of their attachment.

The distinguishing feature of this degree of prolapse consists in the fact that its external surface is continuous with the cutaneous surface surrounding the anus. There is no sulcus between the prolapse and the



FIG. 225.—COMPLETE PROLAPSE OF THE RECTUM, SHOWING CIRCULAR ARRANGEMENT OF THE RUGÆ.

anal margin. The mucous folds which run up and down in the incomplete variety change to a circular direction in the complete types, and surround the prolapse in irregular, crescentic folds (Fig. 225).

The condition may come on gradually, or in rare instances it may be suddenly produced by crushing accidents or excessive straining to lift some heavy object. When the prolapse is first protruded its color is a bright red, but after it has been down for a short time it assumes a dull purplish hue due to venous turgescence. If there is considerable obstruction to the return circulation, it may become tense, swollen, and shining, thus obliterating the circular folds.

In the beginning the prolapse occurs only at stool, and retires spontaneously. Where the sphincters are relaxed or disabled, however, it

may remain down all the time unless held in position by compresses or supporters of some kind. Occasionally where the prolapse is produced suddenly, it may be constricted by the sphincter muscle, and its reduction may be quite difficult. In the early stages the mucous membrane is not altered in any marked degree, but after repeated prolapsing and reduction it becomes excoriated, inflamed, and ulcerated at times. There is nearly always a mucous discharge, and occasionally quite serious hæmorrhages occur in this condition.

The Second Degree.—The prolapse begins at a point more or less removed from the anus, and the rectum protrudes through this orifice, thus leaving a sulcus or space between the protruding gut and the anal margin into which can be introduced a probe, or sometimes even the finger, to the height at which the prolapse begins. This degree never results from incomplete prolapse, nor from hæmorrhoids or tumors attached within the first inch and a half of the rectum. It may be due to stricture, ulceration, or neoplasm of the gut at any point above an inch and a half. Whatever causes persistent peristaltic action, abdominal straining, and prolonged efforts at stool may bring about this type of procidentia.

It may occur gradually, or it may be produced suddenly by some violent strain, crushing accident, fall, or other injury. The author has seen it occur during operations for hæmorrhoids after the sphincter has been dilated and the patient, only partially etherized, begins to strain inordinately. Under these circumstances, however, it has always been very temporary. The extent of prolapse of this degree is limited only by the length of the colon itself, or even the small intestine. Cases have been reported in which the whole colon, ileo-cæcal valve, and several feet of the ileum have protruded through the anus. As a rule, however, 3 to 6 inches is the average amount of protrusion. When the prolapsus does not exceed 3 or 4 inches it will be straight, and its orifice will point in a line parallel with the long axis of the gut. When it exceeds this amount, traction upon the mesorectum begins to draw it backward, and thus producing a curve with its concavity toward the sacrum, drags the orifice in this line. In excessive cases of procidentia the mesosigmoid and mesocolon, each in its turn dragging upon the prolapsed organ, twist it into a sort of corkscrew shape, sometimes making as many as two or three circuits.

Symptoms.—The symptoms of procidentia of the first and second degrees are practically the same. In children the mass protrudes only at stool, as a rule, but in old people, where there is atony and relaxation of the sphincters, it may remain down all the time. Constipation is the rule in young and old alike until the rectal mucous membrane becomes excoriated or inflamed, after which a teasing, irritating diarrhœa may

begin. Discharges of mucus, sometimes tinged with blood, are nearly always present. Owing to the relaxed and overstretched condition of the sphincters, the loss of sensibility in the mucous membrane, and persistent peristalsis kept up by the irritation in the rectum, a mild form of incontinence of feces often exists in these cases. Pain is not a prominent symptom unless there is ulceration in the lower portion of the rectum, or spasm of the sphincter constricting the prolapse.

The one persistent symptom upon which the diagnosis rests, consists in a protrusion of the entire thickness of the gut during defecation. The condition can only be confounded with hæmorrhoids and neoplasms

of the rectum which prolapse. The irregular, lobulated shape, the varicose condition of the vessels, and the fact that at certain portions of the circumference of the rectum the mucous membrane remains *in situ*, serve to distinguish these conditions from procidentia.

The excoriation and granulation of a chronic procidentia of either the first or second degree sometimes result in a hypertrophic, nodular condition which resembles very much epithelioma of the rectum, and can only be distinguished from this condition by microscopic examination.

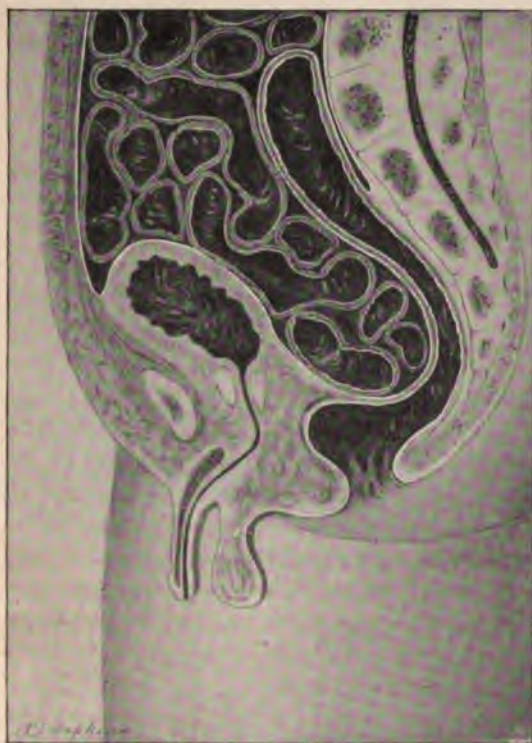


FIG. 226.—RECTAL HERNIA OR ARCHOCELE.

As will be seen from the illustrations, these varieties are prone to be complicated by a descent of the recto-vesical or Douglas's *cul-de-sac*, in which may be contained loops of the small intestine, thus constituting a rectal hernia or archocele.

In the early stages of this condition these loops are contained only in the anterior portion of the prolapse, and produce a smooth, round prominence at this portion (Fig. 226). But where the prolapse has ex-

tended to a distance of 5 or 6 inches the peritoneal *cul-de-sac* and its hernial contents may entirely surround the gut, with the exception of the narrow portion to which is attached the mesentery. Under such circumstances the entire circumference of the prolapse will appear much thickened, soft, and pliable.

The diagnosis of this condition may be made in several ways. Percussion with the pleximeter will sometimes give a tympanitic note enabling one to say that there is air between the two layers of the prolapse, but this does not positively denote the existence of a loop of intestine therein. If, when the prolapse is down, the patient is placed in the knee-chest posture and the parts manipulated, the gurgling and feel of the returning gut can be easily distinguished, just as in the case of inguinal hernia. Occasionally attachments will occur between the small intestines and these hernial sacs, making it impossible to reduce the hernia without the prolapse being carried along with it; in such cases strangulation is very likely to occur. Several instances have been reported in which the rectum has ruptured and the small intestine has burst out from the peritoneal cavity under these circumstances. Strange to say, wherever this has occurred, the prolapse has at once been spontaneously reduced, and only the small intestine remained protruding from the anus. No satisfactory explanation of this fact has yet been given.

Other complications, such as strangulation and gangrene, with sloughing of the prolapse, have been noted in medical literature, but these cases chiefly occurred before the use of anæsthesia became so general. With it prolapses can be almost invariably reduced, and no practitioner hesitates to employ this means at once.

Third Degree.—This degree of procidentia consists in a falling down or intussusception of the upper portion of the rectum and sigmoid into the lower portion or rectal ampulla. It differs from ordinary intussusception in that it does not cause strangury or complete obstruction, probably on account of the wide distensibility of the rectal ampulla; and secondly, the peritoneal coats which come in contact with each other do not adhere and become fixed as in cases of typical intussusception of the bowel higher up. In this degree the gut prolapses, but it does not protrude from the anus. The sphincter muscles and the anal aperture remain normal. The patient has no sensation of any protrusion when at stool, nor is there any soreness or pain about the margin of the anus.

Speaking from a mechanical point of view, this degree is only the first step of the second degree of procidentia, only it is higher up, and in the large majority of cases never proceeds to actual protrusion through the anus.

Symptoms.—The symptoms of this condition are quite obscure. The patient will nearly always give a history of having suffered from con-

stipation, but after a protracted period of this disorder he may develop an irregular diarrhoea. In whichever state he is found, one can always elicit the fact that when he goes to stool the act is never satisfactory. There always appears to be something more to come away. This sensation is similar to that produced by the presence of a foreign body, and often results in straining and prolonged sitting at the toilet.

Laxatives are never satisfactory in their effects. Enemas are essential to a comfortable movement of the bowels, and these act more by raising the prolapsed gut upward and thus relieving the intussusception than by stimulating peristalsis. Heaviness and weight in the sacral region associated with dull, aching pains radiating to the thighs, are frequently complained of. At other times there is aching in the perinæum with dysuria and disorders of the sexual functions. In some cases the author has observed a dragging upon the lumbar and lower abdominal regions. The symptoms are very likely to be mistaken for ovarian or tubal diseases in women. Flatulence, intestinal indigestion, and mucous colitis are almost constant accompaniments of this disorder.

At first the mucus discharged is clear like the white of an egg; afterward it becomes tinged with blood and contains a small quantity of pus. These latter changes are produced by the friction and irritation of the mucous membrane due to the prolapse and recession of the gut, causing first a stimulation and then excoriation, and finally ulceration. In Plate I, Fig. 6, a typical ulceration occurring upon the crest of such a prolapse is represented.

Occasionally there is associated with this condition a so-called membranous colitis accompanied by marked exhaustion, and sometimes severe abdominal pains after stool. None of these symptoms is uniformly present, however, with the exception of the feeling of unfinished business, flatulence, and irregularity in the movement of the bowels.

Etiology.—The causes of this type of procidentia are various. Any neoplasm of the sigmoid or upper portion of the rectum may induce a gradual descent until the growth reaches a resting-place in the ampulla of the rectum. Whatever causes constriction of the gut and obstruction to the faecal passages will also result in this type of prolapse. Thus, unusual contracture at the recto-sigmoidal juncture, fibrous or malignant strictures, perirectal strictures or ulcerations causing spasmodic contraction, will cause the arrest of the faecal masses above these points, and consequently a sagging down or intussusception of the intestine above into that below. Chronic constipation almost invariably precedes this condition, and we have associated with it a hypertrophic catarrh of the mucous membrane with hyperæmia and thickening of the walls. The ulcerations which are occasionally found in this condition are in all probability the result of it, and not the

cause, being produced by the constant friction of the gut's slipping up and down. In the cases in which the abdomen has been opened for the purposes of fastening the gut so as to prevent its prolapse, the author has always found an abnormally elongated mesosigmoid and mesorectum. Elongated, peritoneal supports, associated with intra-intestinal neoplasms, inflammation, or obstructions, are in general the causes of this condition.

Dr. F. Schmey (Centrbl. f. Kinderheilk., 1897, Bd. ii, S. 41), after an extensive experience in this line, states that the large majority of prolapses of the rectum in children is due to rhachitis. In elderly people progressive atony of the intestinal muscles may also be considered as a predisposing cause.

Pathology.—To understand the organic changes which the prolapse itself involves, it is necessary to refer the reader once more to the supports of the rectum (Chapter I, p. 47). It will be remembered that the latter is held in position by several different classes of supports. The lower portion is maintained in position by the levator ani and external sphincter muscles, the perineal fascia and fibrous attachments to the coccyx, and the prostatic or vaginal walls; the middle portion is supported by the loose fibrous tissues which pass off from the sacrum along the course of the lateral sacral arteries and line the upper surface of the levator ani, thus connecting the organ with the osseous frame of the pelvis. The superior portion is held in position by the peritoneal folds which connect it with the pelvic walls upon the sides, the bladder or uterus in front, and with the sacrum behind, where the mesorectum and mesosigmoid comprise the chief support of the gut.

In order for procidentia to occur there must be a weakening or destruction of these supports as well as some force capable of dislodging the organ from its position. The passive supports, composed of fibrous and elastic tissues, lose their efficiency through gradual elongation or rupture; the active supports, composed of muscular tissues, lose theirs through atrophy, injury, or paralysis. In procidentia of the first and second degrees the pathological changes consist in alterations in the muscular apparatus and fibrous attachments of the lower end of the rectum to the surrounding parts; in that of the third degree the alterations take place in peritoneal, vascular, and connective-tissue supports. The latter condition is always of a gradual and slow development; the former may come on suddenly from accident or injury, or it may develop gradually from the extension of a procidentia of the third degree. In the case seen with Dr. Ladinski (Fig. 167), where the prolapse was due to a marked fibrous stricture 6 inches above the anus, this gradual development was undoubtedly the course of the disease.

In traumatic cases the prolapse occurs first, and the atony or weakening of the muscles is secondary. In old people and sodomists, and in children that have suffered from exhausting diseases, the relaxation of the sphincters is primary and the prolapse secondary.

Along with the other changes which occur, there is the absorption of the perirectal fat in the retro-rectal, superior pelvi-rectal, and ischio-rectal spaces.

Treatment.—The rational treatment of complete prolapse of the rectum will depend upon the exciting cause, the type, and the actual pathological changes which have taken place in the organ itself and the surrounding tissues. It is useless to suppose that a procidentia can be cured by restoring the rectal supports if the exciting cause remains active. Such conditions as hæmorrhoids, neoplasms, strictures, and ulcerations must all be eradicated before a permanent result can be obtained. All the methods of accomplishing this have been described in their proper places. Assuming, therefore, that this has been done and the prolapse persists, the surgeon must proceed to restore the rectal supports to their normal condition.

In children and old people in whom this condition is the result of constitutional debility, exhausting diseases, summer diarrhœa, dysentery, rhachitis, or general senile muscular relaxation, together with decreased sensitiveness to normal stimuli, one will obtain the best results by the treatment of these conditions. Schmey states that nearly all prolapses in children may be radically cured by the administration of phosphorus in increasing doses. He recommends the following prescription:

R B. phosphor.	0.01;
Ol. jecoris aselli	100.0.
Ft. sol.	
Sig.: One to three coffee-spoonfuls daily.	

The author has long taught that procidentia in the young is ordinarily amenable to very conservative methods. Many of the cases occur in weak, debilitated children suffering either from rhachitis or the result of some exhausting disease, and constitutional treatment, such as has been advised by Dr. Schmey, will be necessary in all of them. Phosphorus in some form, strychnine, hypophosphites, cod-liver oil, and arsenic are useful adjuvants in the treatment. These all act, however, in restoring the muscular supports by toning up the levator ani, the sphincters, and the longitudinal muscles of the gut. It is a matter of the utmost importance that the prolapse should be kept in position as much as possible while these drugs are restoring the retentive powers.

It is a well-established fact that if an intestine is held in one position for several weeks, it will become fixed at that point, and only be removed from it by some unusual force. The secret of success in the treatment of prolapsus recti in children lies in our ability to maintain the organ in its natural position while the general constitutional condition and muscular tone are being restored to normal. In addition, therefore, to the constitutional treatment of these cases, local applications, such as stimulate contraction of the sphincter muscles and retraction of the prolapsed gut, should be frequently made. Cold water is one of the best of such applications; solutions of alum or tannic acid applied to the prolapsed gut often act with good effect. Where the prolapsus is cedematous and swollen, excellent results may be obtained from the application of an absorbent pad soaked in a 25-per-cent solution of boroglyceride.

In order to prevent the prolapse of the gut during the act of defecation, the child should be forced to use the bedpan, or, what is better still, to have its movements while lying on the side, the bed or table being protected by pads of cotton, oakum, or some other substance which can be destroyed. In order to facilitate these movements and avoid straining, it is better to give the child an enema just before laying it in position.

Where the prolapsus occurs at other times than when at stool, or when it remains down except when replaced by manual efforts, some method will be necessary to maintain the gut in position while the alterative processes are going on. There is no better means of accomplishing this than broad adhesive straps used in the manner advised by Dr. Powell, of New York. The application of these straps is made while the bowel is reduced and while the child is lying upon its side; they should be about 3 inches wide, and should pass from one trochanter to the other, the buttocks being drawn closely together and folded in; the posterior edge of the strap should pass just in front of the margin of the anus. Ordinarily these straps are applied directly over the anus, so that they must be removed every time the child defecates; this is a mistake, because frequent reapplications bring on an irritation of the tender skin, and it soon becomes ulcerated. If the strap is placed in front of the anus, the child may lie upon its side or upon the bedpan and defecate without soiling it or necessitating its removal more than once in a week or ten days.

Compresses for supporting a prolapsed anus are not satisfactory in accomplishing the result, and at the same time by their pressure upon the sphincter they cause dilatation and relaxation of this muscle, and thus practically prevent the very end that is sought. In old people, who constitute the greatest number of cases of prolapses, with the ex-

ception of children, there is a different cause for the condition. Often there are neoplasms, hæmorrhoids, strictures, chronic constipations, and other diseases of the rectum associated with an absorption of fat from the perirectal spaces, a general decline in muscular tone, and a decrease in nervous sensibility. Rhachitis is not an element in these cases so much as general muscular atony.

The constitutional treatment is of importance, but one can not expect to restore the waning powers of age and accomplish such favorable results by it as in children. At the same time, it should be used, and especially in the forms of strychnine and arsenic. The local applications mentioned above are useful in these cases, and adhesive straps may also be of benefit.

Allingham and others recommend the use of rectal plugs for the retention of prolapsus, and claim to have obtained good results from them; but they can only be of temporary benefit in retaining the rectum in position, and must ultimately do injury, as they constantly dilate the sphincter and by their presence reduce its response to normal stimulation.

Electricity, both galvanic and faradic, has proved useful in these cases. A number of cases have been reported in which this agent has produced a complete cure of the disease, both in children and old people. General massage is also of benefit.

In old people it is a matter of great importance to regulate the bowels, and to obviate, as far as possible, prolonged sitting at stool. If the prolapse is of recent occurrence, it is well to have the patient use a bedpan or lie upon the side, as advised for children, for the movement of the bowels. Laxatives may be employed, but they should not be drastic or griping cathartics. Small enemas of cold water will generally serve to produce an action without much peristalsis or straining. The patient should be taught to have a regular time for going to stool. He should take his enema lying down, and repair to the toilet only when he feels an urgent call for relief.

The length of time which these non-operative methods should be continued will depend entirely upon the history of the case and the extent of the prolapse. Two or three months will suffice to test them.

In children there sometimes occurs an extensive prolapse, coming on suddenly and involving considerable lengths of intestine. This may be brought on by accident, such as great pressure upon the abdomen, being run over by carriages, or falls from considerable heights, and also from acute enteritis with great tenesmus and straining. If seen early and the parts are restored and held in position by straps, the prolapsus may not recur. If, however, it continues to do so, some radical operative interference will be necessary. In general, one may say that

where the parts are irritated, causing the child distress, and where the prolapsus is increasing instead of decreasing, operative interference should be undertaken. One other condition also demands immediate interference, and that is where there is a large extent of prolapsus, spasm of the sphincter, and great turgescence or strangury of the prolapsed gut. Under such conditions delay is unjustifiable, and operative interference should not be put off.

Strangury and sloughing from prolapsus of the rectum is very rare in children and old people. It occurs in adults and middle-aged individuals, and the sloughing even then is generally limited to the mucous membrane. There are cases, however, reported in which the whole prolapsed gut has sloughed off, and thus a spontaneous cure of the procidentia has resulted. In these cases there has always followed a cicatricial contraction or stricture which has been very difficult to manage. The dangers from such a process, and the unsatisfactory final result, absolutely forbid dilatory action in these conditions.

Reduction.—Ordinarily prolapses of the rectum are reduced spontaneously or can be easily replaced by the patients themselves. Sometimes, in excessive cases or in those produced by accident, the patient is unable to reduce the gut, and the surgeon is called in for this purpose. If the procidentia has been down for any length of time and the sphincter is tightly contracted around it, there may be great swelling and œdema of the tissues, and the difficulties of reduction will be found by no means slight.

The methods to be employed in such cases are various, and each case will present a problem in itself. It is advisable that the replacement should be made without general anaesthesia, if possible, in order to avoid the subsequent nausea and straining which will tend to reproduce the procidentia. If, however, after due manipulation the reduction can not be accomplished, one should not hesitate to administer it, stretch the sphincter, and reduce the procidentia.

When called to a case of unreduced prolapsus, one should carefully examine the parts to determine whether it is complete or incomplete. The condition of the mucous membrane should also be carefully examined to note if strangury, ulceration, or sloughing has taken place. These conditions will depend, of course, upon the length of time which the gut has been down and the amount of constriction. If there is great congestion or œdema, firm pressure with hot cloths should be made for some time before any attempt at reduction. Cold is never advisable in these cases, as the circulation is always deficient, and one may bring on sloughing by its use.

Applications of cocaine and suprarenal extract will assist in contracting the blood-vessels and reducing the volume of the prolapse.

The patient should be placed in the knee-chest posture or in Sims's position, with the hips well elevated, the former being by all means the best to reduce the amount of blood in the parts, and also to obtain the influence of gravitation upon the upper end of the intestine, thus assisting in its reduction. By this position a hernia, if present, will be reduced, and often after this the prolapse will retire spontaneously. After gentle and continued pressure with hot compresses and the applications mentioned, one will generally find that the circulation of the parts is improved, and the œdema and congestion will have greatly disappeared. Efforts at reduction may then be begun, and they should always be directed through the lumen of the bowel at the end of the prolapse. Allingham states that whenever this lumen points backward toward the sacrum one may conclude that there is hernia of the small intestine along with the prolapse. This is not always so, for the author has seen one case in which the lumen was twisted almost to the sacrum, and yet in which there was no hernia present. Great care should be exercised in the manipulation that one does not bruise or irritate the parts. In order to carry the inner layer of the prolapsed gut upward, the finger or a bougie should be gently introduced into its lumen and carried upward, thus undoing the outward invagination and shortening the prolapsus. In order to accomplish this the bougie should not be oiled, as it will then slide over the mucous membrane and not carry the gut upward. An ingenious device is to wrap a small piece of tissue paper around one's finger, introduce its end into the lumen of the prolapse, and gently push upward. By this means the inner layer of the prolapsus is carried upward, while the outer layer is little by little enfolded on the finger. Having reduced the prolapsus thus far by a boring motion, the finger is released from the tissue paper and withdrawn; the paper remains and assists in preventing the prolapsus from recurring. This procedure is repeated until the entire prolapsus is reduced. The same method may be applied with a small rectal bougie, but in the writer's experience the finger has been all that is necessary to accomplish the reduction. A full dose of morphine administered hypodermically is sometimes of great assistance in the accomplishment of the reduction. Where the sphincter is so tight that it constricts the gut and prevents its return, one should not consume valuable time in lengthy and vigorous taxis, but resort to the use of general anæsthesia, stretch this muscle, and accomplish the reduction.

Reduction in Gangrenous Conditions.—When sloughing has taken place, one should be very careful to determine its depth before attempting to reduce the prolapsus. If the walls of the gut have become gangrenous, or likely to perforate, it will be very dangerous to reduce

such a condition, inasmuch as it might open into the peritoneal cavity and thus produce a fatal peritonitis. In such cases immediate amputation should be resorted to instead of waiting until the slough comes away spontaneously, because under such circumstances the upper end of the gut may retract and thus open the peritoneal cavity and allow all the contents of the bowels to be emptied into it. By immediate amputation the upper end can be caught and fixed by sutures or forceps until inflammatory adhesion shuts off the peritoneal cavity, and such dangers are avoided.

After the reduction of the prolapsed mass, the question of future treatment will arise. If the procidentia is acute, whether due to accident or to other sudden causes, a compress may be applied to the anus, the buttocks strapped together, the patient confined to bed, and his bowels moved in a reclining posture, until it is seen whether the prolapsus will recur. Sometimes it happens that the gut remains *in situ*, and no further treatment is necessary. But if the case be one of long standing and gradual increase, some operative method for its retention will be necessary.

Operative Treatment.—As will be recognized from the foregoing description of the kinds and causes of prolapsus, the method to be selected will depend upon the point at which the prolapse begins and the extent to which it descends. In procidentia of the first degree, in which only a small portion of the lower end of the gut comes down, those methods which narrow the anus and thus obviate the protrusion will be effectual. But if the prolapsus begins high up, and there is a *cul-de-sac* between it and the anal margin, such methods, while preventing the protrusion, will simply convert a procidentia of the second degree into one of the third degree, and will in all probability prove of no permanent benefit. The principles upon which the cure of procidentia depends are, first, the removal of any exciting cause; and, secondly, the restoration of the supports which have been altered or destroyed. It can therefore be seen that if the prolapse be due to stretching or rupture of the passive supports, it will be necessary to restore these or to devise others to take their places before the prolapse can be radically cured; and if it be due to relaxation, overstretching, dilatation or paralysis of the muscles, the treatment must be directed to the restoration of the normal condition in these parts. In complete prolapsus of the first and second degrees, we have to deal with rupture or elongation of the adhesions between the lower end of the rectum and the surrounding tissues, especially its attachments to the coccyx, sacrum, and prostate or vagina, together with muscular atony or relaxation. Appreciating these facts, Allingham and Van Buren devised methods for restoring the adhesions between the rectum and

these parts by setting up an inflammation in the walls of the gut, and thus causing agglutination with the perirectal tissues.

Allingham's Method.—This consists in the application of nitric acid or acid nitrate of mercury to the prolapse. The patient is anæsthetized and the gut brought down, washed off, and dried. "The acid must be applied all over it, care being taken not to touch the verge of the anus or the skin. The part is then to be oiled and the rectum stuffed with wool. A pad must after this be applied outside the anus and kept firmly in position by a strapping plaster, the buttocks being by the same movements brought closely together; if this precaution be not adopted, when the child recovers from the chloroform (the straining being urgent) the whole plug will be forced out and the bowel will again protrude. When the pad is properly applied the straining soon ceases and the child suffers little or no pain." The bowels are confined for four days; after this the strap is removed and castor-oil is administered to move them. He states that the treatment is chiefly applicable to procidentia in children, and rarely fails if properly carried out, but sometimes it is necessary to apply the acid more than once. The author has never had the temerity to employ this method as advised by Allingham.

Theoretically, it appears that so strong an agent applied to the entire mucous membrane of the gut would produce a sloughing and subsequent ulceration which would result in stricture. There is absolutely no control over the action of the acid and the depth to which it will burn. Whether this burning is any more severe in the tender tissues of the child than in the adult is questionable, but certainly the walls of the intestine are thinner in children, the blood supply is more feeble, and sloughing, it seems, would be more probable. The author has used nitric acid, however, as follows: A very small quantity of absorbent cotton is wrapped around a long platinum or wooden applicator and dipped into the acid; this is laid upon the prolapsing gut at points about $\frac{1}{2}$ an inch apart around the rectum, so as to produce linear cauterization and leave healthy strips of mucous membrane between them. These are carried from the margin of the anus to the highest portion of the prolapse, the lumen being held open by small retractors while the applications are made. The dressing and after-treatment employed have been the same as Allingham's, except that a drainage-tube extending above the packing was introduced to allow the escape of gases.

Van Buren's Method.—The patient is anæsthetized, the prolapsus is dragged down as far as it will come, thoroughly washed off, and dried; the actual cautery is applied in lines about $\frac{1}{2}$ an inch apart all around the circumference of the gut, extending from the margin of the anus to the highest point of the prolapsus. A cauterizing iron

or a Paquelin cautery, heated to a bright heat, may be used. Van Buren says that the latter instrument is not suitable for this purpose on account of its not maintaining its heat long enough. The author, however, has found it very satisfactory for this purpose. A narrow blade should be used so as to make the cauterization deep but not wide. The tissues should be burned down to the muscular wall of the gut, care being taken not to perforate this layer, especially on the anterior surface of the gut, because in this region the peritonæum may be involved, and too deep cauterization might penetrate its cavity and thus produce a peritonitis. After the cauterization has been accomplished, the parts should be well oiled and reduced. A drainage-tube should be introduced above the height of the prolapse, and around it there should be packed a mass of wool or gauze, well oiled, in order to retain the rectal walls in close apposition with the surrounding parts. A compress should be applied to the anus and held in position with an adhesive strap which draws the buttocks together. The bowels should be confined for four or five days and the patient kept in a recumbent posture. At the end of this period an enema should be given through the drainage-tube, and the patient's bowels moved while on his side or back. The gauze packing will be expelled with the movement of the bowel, and generally the prolapsus will not recur. The patient should be required to move his bowels in the reclining posture for two or three weeks.

These methods are often successful in the treatment of prolapsus of the first degree if they are applied in the early stages; but if the condition is neglected until the prolapsus becomes very large and the walls thickened and hypertrophied, they are not likely to result in permanent cure. In grown people, Allingham himself does not place much confidence in his method. He states that the applications do good, but that the relief is only temporary. The free application of acid to old people with broken-down constitutions, he says, is likely to produce deep sloughing and subsequent hæmorrhage. He also admits that it may produce stricture, and he cites the case of a girl in whom such a result did occur, although the prolapsus was cured. The Van Buren method is more frequently successful, but it is only applicable to cases of the first degree. If the prolapse involves the upper portions of the rectum, those surrounded by the peritonæum, it is perfectly clear that methods which depend upon inflammatory adhesion of the gut to the surrounding tissues will be comparatively useless.

Where the prolapse is of small extent, the removal of folds of mucous membrane at four or five points around its circumference by the clamp and cautery, as advised by Mr. Henry Smith, has frequently proved entirely successful. One may also, in this class of cases, dissect

off elliptical strips of mucous membrane, bringing the edges together with silkworm-gut or chromicized sutures, thus narrowing the lower end of the rectal canal, and overcome the prolapse for the time being. The permanency of such relief is very doubtful.

Duret's operation (*Bull. et mém. de la soc. de chir.*, Paris, 1900, p. 470), known as rectorrhaphy, first reported in a thesis by Masson, 1894, is similar to that done for prolapsus vaginæ. Upon the anterior and posterior surfaces of the prolapsus an elliptical flap of mucous membrane is dissected out, extending from the summit to the base, thus leaving two lateral pillars of mucous membrane. The muscular walls are folded in by buried silk sutures and the edges of the mucous membrane approximated by superficial ones. By this means the cavity of the ampulla is changed into a regular cylinder of small

caliber (the same as is done in colporrhaphy). Finally, he removes triangular flaps of skin from the margin of the anus and sutures the edges of the wounds together, thus narrowing this orifice both anteriorly and posteriorly. In a case operated on in 1894 after this method, and examined twenty months later, the result was perfect. This operation is only a modification of the Dupuytren method, and will accomplish nothing more than the clamp and cautery.

In minor degrees of procidentia the condition may sometimes be relieved by some

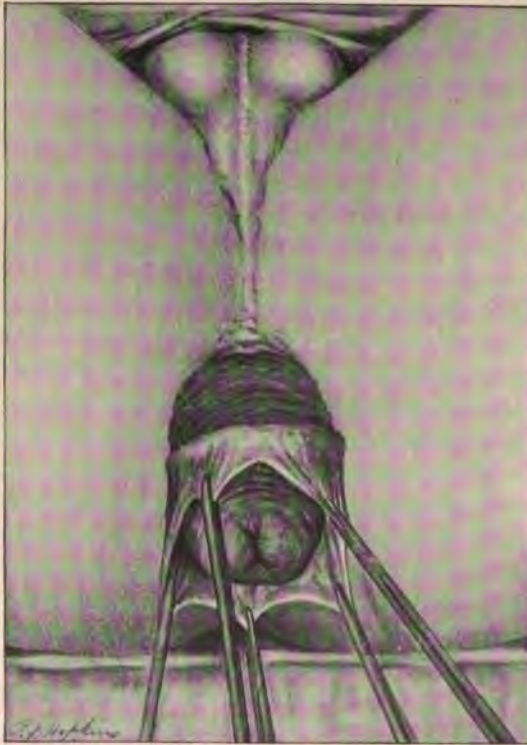


FIG. 227.—DELORME'S OPERATION FOR PROCIDENTIA RECTI.

modification of the Whitehead operation. The mucous membrane is dissected from the prolapse, excised, and the cut borders sutured to the margin of the anus, thus tucking or folding in that portion of the gut which was prolapsed. Delorme (*Bull. et mémoires de la soc. de*

chirurg., Paris, 1900, p. 499) advises this operation even in large prolapses of 4 to 6 inches in extent. He gives an elaborate description of how the mucous membrane is dissected from the prolapse (Fig. 227), practically denuding the entire rectum. It is cut off and then sutured to the mucocutaneous border. The thickened and freshened surfaces of the gut are thus invaginated above the line of sutures. He claims that this reduplication (Fig. 228) not only produces a narrowing of the canal, but also increases the sphincteric action, which is beneficial to the patient. He reports 3 cases in which he removed 20, 30, and 80 centimeters (about 8, 12,



FIG. 228.—DELORME'S OPERATION COMPLETED, SHOWING REDUPLICATION OF RECTAL WALL.

and 30 inches) of the mucous membrane, obtaining excellent results in the first 2 cases and death from septic peritonitis in the third. It is impossible to conceive that such a method would not result in stricture at the lower end of the rectum. It has this one advantage, however, that in cases due to hernias through the rectal *cul-de-sac*, this thickened ring will furnish an obstacle to the descent of the peritoneal pouch, and thus effectually prevent the recurrence of the prolapse.

These operations, limited to the mucous membrane, have often proved ineffectual, and many procedures involving the deeper tissues have been devised. The principal ones are those of Roberts, Dieffenbach, Lange, Verneuil, and Peters.

The Dieffenbach-Roberts operation consists in the removal of a section of the gut at its posterior commissure, extending about 2 inches upward. The entire thickness of the intestine with the sphincter muscles are removed, and the caliber of the lower end of the rectum and anus is thus greatly reduced. The success of the operation depends upon primary union of the parts. If this fails, it is liable to result in an increase of the prolapse, together with incontinence of feces. The operation is not applicable to prolapses beginning high up, as it does not affect the original cause.

Lange has advised infolding the rectal ampulla from the outside, thus narrowing the canal so as to prevent the prolapse. His operation consists in making an incision from the posterior margin of the



FIG. 229.—INFOLDING OF THE GUT IN PETERS'S OPERATION FOR PROCIDENTIA RECTI.

anus upward alongside of the coccyx, and deep enough to expose the posterior wall of the rectum. The levator ani muscle is dissected off, and the walls of the gut are then infolded by a line of sutures introduced through the muscular layer, thus narrowing the caliber and stiffening the wall to such an extent as to prevent the prolapse.

Verneuil (*Gaz. des hôpitaux*, May

2, 1892) modified Lange's method by gathering the gut in horizontal folds, thus shortening it, after which he sutured it to the sides of the coccyx and sacrum by buried sutures and closed the external wound.

Peters (*International Text-Book of Surgery*) advocates an operation similar to this upon the anterior wall of the rectum. He makes an abdominal incision in the median line large enough to admit of the manipulation of the anterior wall of the rectum in the peritoneal pouch. The prolapse having been drawn upward by dragging on the sigmoid, the anterior wall of the gut is infolded by Lembert sutures (Fig. 229), the ends of which are left long, and pass through the muscular layer of the abdominal wall, thus forming a sort of sling to support the rectum (Fig. 230). The adhesion of the peritoneal surfaces narrows the caliber of the rectum and thus obviates the recurrence of the prolapse.



FIG. 230.—ATTACHMENT OF THE GUT TO THE ABDOMINAL WALL IN PETERS'S OPERATION.

None of these methods, with the exception of Verneuil's, accomplishes anything more than narrowing of the anal outlet and an inflammatory adhesion of the extreme lower end of the rectum to the surrounding parts. As a consequence they all fail to retain prolapses of considerable magnitude. George R. Fowler (Med. News, N. Y., February 27, 1897) first practised suspending the rectum by sutures carried around the coccyx. He is therefore entitled to priority in the application of a principle which the author employs as follows:

Rectopexy or Suspension of the Rectum upon the Sacrum.—The patient is prepared by thorough cleansing of the intestinal canal, shaving the perinæum and sacral region, and applying an antiseptic dressing the



FIG. 231.—RECTOPEXY FOR PROCCIDENTIA RECTI—THE INCISION.

night before the contemplated operation. After being anæsthetized he is placed in the semiprone position on the left side with the hips elevated on pillows and the thighs well flexed on the abdomen. The prolapse is then dragged down to its full extent and held forward by an assistant. A curved incision about 2 inches in length is made midway between the coccyx and anus (Fig. 231). This is carried through all the tissues into the retro-rectal space. With the fingers or a dull instrument introduced through this incision, the rectum is separated from the coccyx and sacrum posteriorly as high up as the attachment of the mesorectum and on the sides as far as the attachment of the lateral ligaments. The latter should be sedulously preserved. The anterior

surface of the bone is then gently curetted to remove all the fatty tissue and freshen it. At this point the assistant reduces the prolapse, and with his fingers inside the gut inverts and brings it out through the incision (Fig. 232); the operator catches the protrusion and drags the

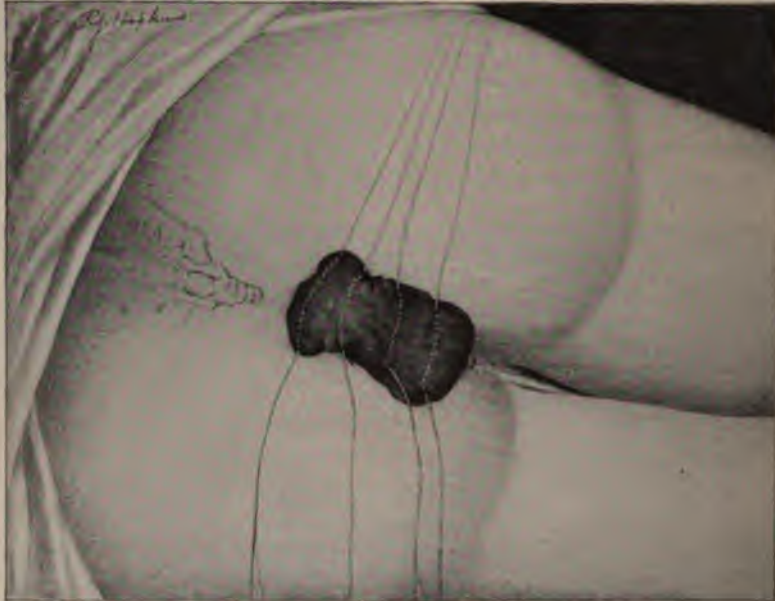


FIG. 232.—RECTOPEXY—THE GUT INVERTED AND BROUGHT THROUGH THE INCISION; THE SUTURES PASSED THROUGH ITS MUSCULAR WALLS.

gut down as far as it will come, usually a little less than the amount prolapsed through the anus. The external surface or muscular wall of the gut thus exposed is then curetted as was the sacrum. Silkworm-gut or silver-wire sutures are then passed transversely through the muscular layer, embracing as much of the circumference of the gut as possible; they are placed $\frac{1}{2}$ inch apart, and the ends left 6 to 8 inches long. After the sutures have been placed, the ends of the upper ones are each in turn threaded on a long, curved Peasley's needle and carried up through the wound to the highest point of the separation between the rectum and sacrum, where they are made to penetrate the tissues, and are brought out through the skin on opposite sides of the bone. The other sutures are treated in like manner, each being brought out $\frac{1}{2}$ inch lower than the preceding one (Fig. 233). The ends are then drawn taut, and the prolapse is thus dragged up into the hollow of the sacrum where it belongs. A pad of gauze is laid over the sacrum, and the sutures tied over this to avoid their cutting into the skin (Fig. 234). Before tying the sutures the space

between the rectum and sacrum should be freed from all clots and the oozing checked. The gut is thus anchored in close apposition with the sacrum, to which it unites in due time. The external wound is closed by buried catgut and subcutaneous sutures. If the sphincters are much relaxed or overstretched, a ligature of kangaroo tendon (Fowler) is passed around the anus at the upper margin of the external sphincter, and tied over the index finger introduced through the anus, as has been advised by Platt. This narrows the anal outlet and causes contracture of the muscle, thus contributing to the cure. The bowels are confined for eight days, when they are moved by enemata. The patient is required to remain in bed and use the bedpan for three weeks, after which time he may be allowed to go to the toilet. The anchoring sutures are left in from ten to fourteen days.

Up to the present writing the operation has been employed by the author in 10 cases; 3 of them have been in old people, 5 in people of

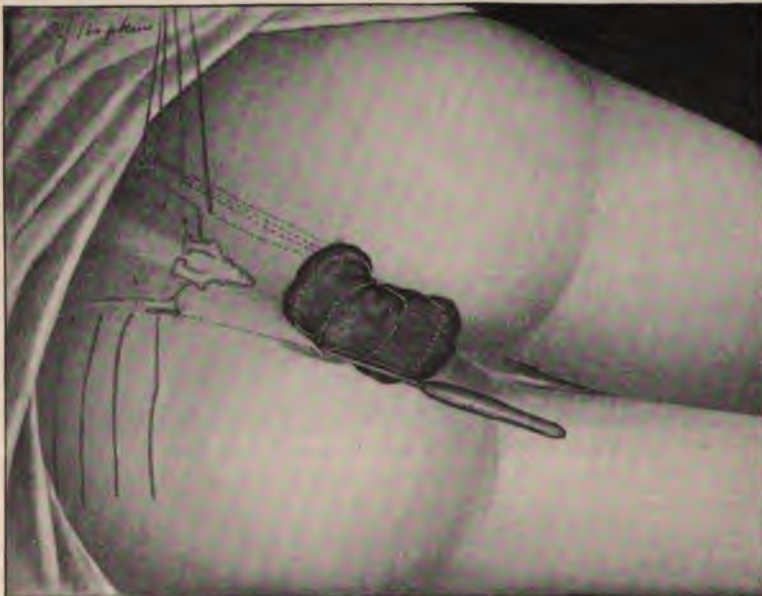


FIG. 233.—RECTOPEXY—THE SUTURES OUT THROUGH THE TISSUES ON EACH SIDE OF THE SACRUM.

middle age, and 2 in children. In 2 of these the procidentia had existed for fifteen and eighteen years respectively. Seven of them have remained cured from one to three years. Three have been done less than a year, but so far there has been no recurrence. In the case of a woman of thirty-five years of age, operated on through the courtesy of Dr. Lusk, several other methods had been tried, and among them the

Dieffenbach-Roberts operation, which resulted in incontinence and large cicatrices at the posterior commissure of the anus, necessitating a plastic operation to restore the sphincter after the prolapse had been sutured to the sacrum. It has now been eighteen months since this operation was done, and beyond a slight prolapse of the mucous membrane at the anterior commissure there has been no recurrence. This is certainly one of the severest tests to which the operation could be put. The method is only effectual in those cases in which the prolapse is confined to the rectum, and below that portion which is entirely surrounded by peritonæum. It would be useful, no doubt, in all cases

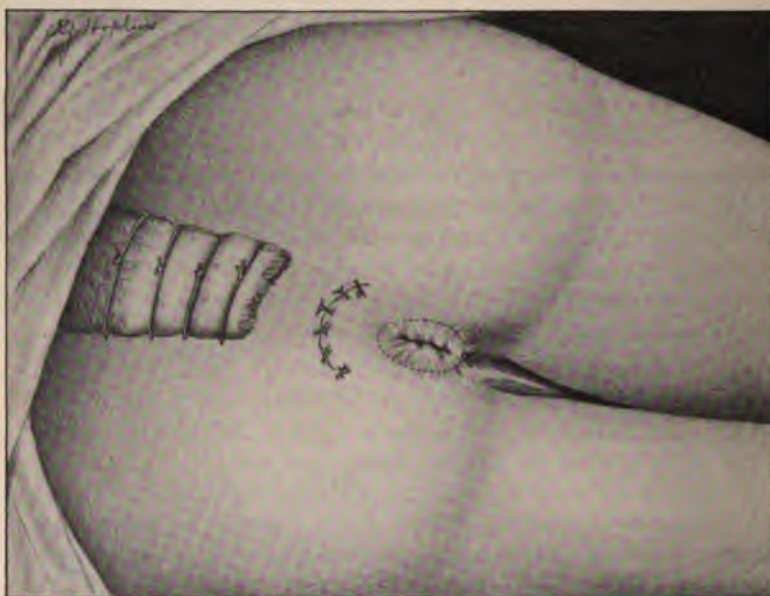


FIG. 234.—RECTOPEXY—THE OPERATION COMPLETED.

of prolapse of the first or second degree to whatever length they extended, but it is perfectly clear that it could not overcome a procidentia of the third degree. For a prolapse, however, of 5 or 6 inches, it will prove entirely satisfactory.

In complete prolapsus of the second and third degree, in which the upper portion of the rectum and sigmoid flexure are involved, there is an entirely different problem to solve. The anus and lower end of the rectum may be narrowed and thus obviate the protrusion of the prolapse; but this simply shuts out from view the displaced organ, and in no wise restores it to position. These conditions depend upon the giving way of the superior supports or upon an abnormally long mesentery, and their treatment consists in a restoration of these

supports or the substitution of others for them. The exciting cause should be removed; if there be stricture of the gut, it should be dilated or resected; if neoplasms, they should be removed; and ulcerations should be healed if possible. The methods accomplishing this will suggest themselves to the operator in individual cases. Inasmuch as most of these prolapses occur at the time of stool, and are associated with constipation and difficulty in defecation, restoration of these functions, so as to produce regular and easy stools, should be always first attempted. This may eradicate the cause and alleviate the suffering, but it can not restore the supports of the intestine. Persistent replacement of the prolapse, retaining it inside by adhesive straps across the buttocks, the movement of the bowels in a reclining posture, and the injection of astringent fluids, may sometimes prove effectual in procidentia of the second degree in children and in people of middle age; but in old people and in debilitated constitutions, such methods are not likely to prove permanently beneficial.

In prolapse of the third degree great relief to the symptoms may be given by persistent, periodic introduction of long Wales bougies, by which the gut is carried back into position, and the movement of the bowels greatly facilitated. This is only a palliative treatment, and while the author still recommends it as the most conservative and satisfactory non-operative method, he can not say that its effects are at all permanent.

In view of the fact that many cases of prolapses only occur at the time of stool, it has been suggested that absolute physical rest of the rectum would result in the organ's resuming its normal position and becoming fixed there. In order to accomplish this an artificial anus must be made and borne for a sufficient time for these changes to take place. This method was employed first by Jeannel in 1889, and afterward by Bryant in 1893. Jeannel's case, however, was not a fair demonstration of the principle, inasmuch as he dragged the sigmoid and rectum from below up into the wound until the lower segment was taut, and suturing it in this position thus held the gut up and prevented recurrence of the prolapse. He afterward closed the artificial anus without dissecting the gut loose from its attachment, and obtained a permanent cure of the prolapse. The result in this case was undoubtedly due to the adhesion between the gut and the abdominal wall. In Bryant's case, however, no effort was made to drag the prolapse upward. A classical inguinal anus was established, the gut being pulled down from above in order to prevent its prolapse through the artificial opening. The result in this case was very good at first, but after some months the prolapse began to recur, and Dr. Bryant was finally compelled to resort to sigmoidopexy in order to overcome the

prolapse. Jeannel, recognizing the facts in his case, suggested that the results would have been just as good had he simply sutured the gut in the abdominal wound and made no artificial anus whatever.

Acting upon this suggestion, Verneuil performed in 1889 the first typical colopexy, as he termed it. Inasmuch as the sigmoid was the portion of the intestine sutured to the abdominal wall, it appears that the term sigmoidopexy would be more appropriate, and we shall adopt it in this work.

The operation consists in drawing the sigmoid and rectum upward until the prolapse is entirely overcome and the lower end of the intestinal tract is made comparatively taut between the anus and the abdominal wound. The sigmoid is then sutured to the abdominal wall, where it adheres, and thus prevents the recurrence of the prolapse. Thus far 51 cases (15 of which occurred in the author's practice) have been collected in which this procedure has been adopted with almost uniform success. The technique of the different operators varies considerably, and increased experience alone can determine which is the best. Most surgeons advise suturing the gut to the parietal peritonæum. In one case in which this operation was done the prolapse recurred after four months. The abdomen was then opened for the second time, and it was found that the adhesive bands between the gut and parietal peritonæum had stretched out to the length of 6 inches, thus demonstrating the fact that the adhesion between two peritoneal surfaces was not sufficiently firm and inelastic to permanently support a large procidentia recti. In this case the peritonæum was stripped off from one side of the abdominal wound to the extent of about 1 inch, and the gut sutured to the transversalis fascia. The result remained permanent for three years, after which the patient disappeared and has not been heard from since. In all subsequent operations, therefore, the author has sutured the gut to the fascia instead of the parietal peritonæum. The technique employed is as follows:

The patient having been prepared for laparotomy, an incision of about 3 inches is made through the body of the left rectus muscle, beginning $2\frac{1}{2}$ inches above the pubis and extending upward toward the umbilicus. The peritoneal cavity having been opened, the patient is placed in the Trendelenburg posture and the parietal peritonæum is stripped off from the sides of the lower angle of the abdominal wound to the extent of about $\frac{1}{2}$ inch. The sigmoid flexure is then caught and dragged upward into the wound until the entire prolapse is overcome and the gut between this point and the anus is drawn comparatively taut. Fine silk or chromicized catgut sutures are then passed first through the transversalis fascia upon one side, then

through the longitudinal muscular band of the intestine, and finally through the fascia upon the opposite side. Three of these sutures are used to fasten the gut to the fascia over a space about $1\frac{1}{2}$ inch in length. The gut thus having been anchored, the upper angle of the peritoneal wound is sutured with catgut, and the abdominal walls are closed by suturing the rectus muscle and its sheath with buried kangaroo tendon, the edges of the skin being brought together by subcutaneous or continuous silkworm-gut sutures. The wound is dressed antiseptically, and the patient is placed in bed, the foot of which is elevated about 2 feet. This position is maintained for five days, at the end of which time the foot of the bed is let down, and the bowels are moved on the seventh day.

The operation has been performed 15 times; in 7 cases for procidentia, and in 8 for adhesions and acute flexure of the sigmoid upon the rectum. The results have been good in every case with the exception that some patients complain of an annoying, dragging pain at the side of the adhesion. In no case has the prolapse recurred.

Dr. Mathews (*Jour. of Amer. Med. Ass'n*, 1901, vol. i) has reported a case in which he overcame a very voluminous procidentia by sigmoidopexy. In this case the gut was sewed to the parietal peritonæum, and the adhesions seem to have been firm enough to support it, as the patient has remained well since 1899.

The method of MacCleod, of Calcutta (recommended by Allingham in the sixth edition of his book), consists in introducing the left hand into the rectum and carrying it upward until the finger becomes prominent above Poupart's ligament. A steel needle is then passed through the abdominal wall, penetrating the cavity of the gut, and, guided by the finger, is carried outward until it emerges upon the abdominal wall about 3 inches inside of the point of entrance. A second needle is then passed in the same direction about 3 inches above the first; the gut being thus temporarily fixed, the hand is withdrawn and an incision is made in the abdominal wall between the two needles and at right angles to them. A careful dissection is made through this incision until the peritonæum is reached. The left hand is then reintroduced into the bowel, and "two series of silkworm sutures are inserted, four on each side, at a distance of about 1 inch apart, so as to attach the serous and muscular coats of the intestine to the abdominal wall. A series of these loops also penetrating the outer wall of the intestine will pass between the several points of these rows, which are made to bring the lips of the wound together, and between them small horsehair stitches are inserted; antiseptic precautions are employed; after the operation a morphine suppository is introduced into the bowel, and opium is given every three hours."

The whole operation seems to be based upon a fear of entering the peritoneal cavity, and yet that cavity is penetrated with a needle passed through the skin and through the cavity of the gut, not only once but four times. There is not a single step in the whole procedure that should not be condemned by every scientific surgeon. This prominence is given to it simply because it has been frequently quoted as an example of sigmoidopexy. It is a most dangerous, unscientific, and uncalled-for operation. The bibliography upon this subject has been carefully covered in the article of Bryant (N. Y. Med. Jour., 1898, vol. i, p. 164).

When the procidentia is not due to neoplasm or organic stricture and can be completely reduced, sigmoidopexy will usually result in its permanent cure. If it be a voluminous case of the first degree, in which the lower and active supports of the gut have given way, the sigmoidopexy may be supplemented by suturing the rectum to the sacrum after the manner which has already been described. When the prolapse can not be reduced, or when it is in such a condition of inflammation or gangrene that it is not wise to do so, some other method of treatment must be undertaken, and in these cases the removal of the strangulated or diseased intestine will naturally suggest itself.

Excision.—Amputation of the prolapsed rectum, while simple enough in itself, may prove a very serious operation. The chief danger lies in the existence of archocele or rectal hernia, which necessitates the opening of the peritoneal cavity through the mucous membrane of the gut. This condition will be discussed among the complications of prolapsus. It is sufficient here to mention the fact that in every procidentia of more than 2 inches, one is likely to meet with a peritoneal pouch in which there may be a hernia of the small intestine. Any operation upon such a prolapse may penetrate this *cul-de-sac* and bring on peritonitis, adhesion, or strangulation of the gut contained in it. Amputation of the prolapse, where the gut is perfectly healthy, can not be considered a very dangerous operation, but it is certainly more so than sigmoidopexy, and is never necessary when the procidentia can be reduced. When the tissues are so unhealthy that it is not safe to reduce the prolapse, amputation through them involves great danger of septic peritonitis. In a certain number of cases where the procidentia is due to organic stricture, which stricture has reached the lowest point of the prolapse, the whole may be excised, and thus the stricture and procidentia cured at the same time. This has been done by Dr. Louis Ladinski in a case which the author had the opportunity of seeing. The procidentia extended $7\frac{1}{2}$ inches outside of and below the anus, and the stricture at its lowest end would barely admit the little finger (Fig. 167). The whole mass was amputated, the edges of the

gut being sutured together, and a most happy result obtained. Where large areas of the sigmoid and colon protrude through the anus, amputation may be successful, but it should not be employed if the gut is healthy and can be reduced, for under such circumstances the intestine may be sutured to its normal position with less danger than is involved in amputation.

In amputating a prolapse of the second degree involving the sigmoid flexure, the point at which the union of the two segments is made will be retracted, and it is very likely to leak and cause infection of the peritoneal cavity. The conditions which seem to justify amputation are: the existence of neoplasms involving the entire thickness of the gut wall, organic strictures, gangrene or sloughing of the protruded gut, and adhesions such as prevent reduction.

Numerous methods of performing this operation have been devised. Those advocated by Treves, Lange, Kleberg, Mikulicz, and Fowler have been most frequently employed. Only the last two methods will be described, as they seem to possess all the advantageous features of the others.

Mikulicz's Method.—The technique as here described differs slightly from that originally laid down by Mikulicz (Deutsch. Gesellsch. f. Chir., Bd. xvii). The patient having been previously antiseptically prepared and anæsthetized, is placed in the lithotomy position with the hips well elevated. The prolapse is then dragged down as far as possible by traction forceps. It is then clamped by two volsella forceps and held in this position by assistants. The elevated position of the hips allows any coils of small intestine to slip out of the peritoneal pouch, and thus avoids the danger of wounding them. After the intestine has been dragged down, it should be surgically cleansed and dried by sterilized gauze. A sterilized conical sponge should be carried up through the gut in order to avoid, as far as possible, any contents of the bowels coming down upon the field of operation. After these preparations, an incision is made through the mucous membrane upon the anterior surface of the gut at the margin of the anus. Dissection is carefully carried through the entire thickness of the intestine, all bleeding being checked as it occurs, until the peritoneal cavity is opened. When this has been done, the serous membrane of the intussuscepted portion of the gut will be brought into view. This membrane should be cut through, and its upper edge sutured to the peritoneal edge of the wound in the anterior layer of the prolapse. Thus, step by step, the peritoneal pouch is closed. This having been accomplished, the entire thickness of the intussuscepted gut is then cut through, little by little, and its muscular and mucous layers are sutured by interrupted silk or chromicized catgut to the mucous membrane

surrounding the margin of the anus at the site of the original incision. In this manner the entire prolapse is excised, and end-to-end union of the gut is accomplished. The ends of the sutures in the muscular and mucous layers should be left long in order to steady the parts and prevent their retraction while the operation upon the other portion of the circumference is being made. All bleeding points should be caught and twisted or ligated during the operation. After completing the excision, if the edges of the mucous membrane are not in accurate apposition a fine running suture of catgut should be applied around the entire circumference to accomplish this. The long ends of the sutures should then be cut off, the wound dusted with iodoform or boric acid, and over this several layers of flexible collodion should be applied. The sponge should then be removed, a good-sized drainage-tube introduced into the rectum, and the parts dressed around it with sterilized gauze. The bowels should be confined for seven or eight days, and opium should be freely administered to quiet peristaltic action. The advantages of this operation consist chiefly in the careful opening of the peritoneal cavity, and emptying it of any prolapsed loops of small intestine or omentum, thus obviating the dangers of cutting or puncturing them, as exists in both the Treves and Kleberg operations.

George R. Fowler's Method.—In this operation a row of fenestrated forceps or common artery clamps is placed just in front of the juncture of the mucous membrane with the skin of the anus in such a manner as to pinch up a circular fold from the outer cylinder of the prolapse for the entire circumference of the gut. Half an inch in front of this fold an incision is made through the mucous membrane only, extending entirely around the prolapse. The proximal edge is then dissected back for half an inch. Two clamps are then placed, one on either side, at the lower end of the prolapse, or the place where the outer cylinder of the gut returns to form the inner cylinder, by means of which the mass is steadied. The index finger of the left hand is then passed into the inner cylinder, and, with this as a guide, the circular incision already made is deepened so as to include the entire walls of the two cylinders. This incision is about $\frac{1}{2}$ inch long. A suture of catgut is now passed so as to include the entire thickness of the two cylinders at the point of this incision, with the exception of the mucous membrane of the outer cylinder which has been turned back at the anal margin. This step of the operation is repeated until the entire circumference of the prolapse is traversed, save that the subsequent sutures are first introduced before the incision is extended. Fowler states that when the posterior portion of the circumference is reached and the mesenteric attachment of the gut encountered, no difficulty

is met in securing the blood-vessels of the mesentery in the suture. He treats this portion exactly as the anterior portion. After the prolapse has been amputated, the cuff of mucous membrane which was dissected back at the beginning of the operation is replaced and sutured in position over the first row of sutures. The operation is performed under a continuous stream of borosalicylic solution, the parts are dressed with a light tampon of zinc-oxide gauze, and the bowels moved on the third day.

He states that the cuff of mucous membrane which is dissected back in the first step of the operation preserves the normal conditions at the anal outlet, and also provides a covering for the sutured edges of the stump, thus diminishing the dangers of subsequent infection (Med. News, 1900, vol. lxxvii, p. 879).

In the second degree of procidentia it will be seen from the illustration (Fig. 223) that amputation will accomplish the removal of only a part of the prolapsed gut. It is questionable whether the operation will result in the retraction and cure of the entire prolapse. There is little question that it will do so in those cases in which the procidentia is due to a stricture or neoplasm, this being removed by the amputation. But where the procidentia is due to simple inflammatory causes, with hypertrophy and thickening of the intestinal wall, it is very probable that the cure will not be complete.

Several cases of stricture resulting from amputation have been reported, but no satisfactory observations have been made as to the final results of amputating large areas of the bowel for prolapsus. The large intestine is one of the chief absorptive organs of the body, and amputation of any considerable portion of it may seriously interfere with the nourishment of the patient. This fact should always be considered where the operation of excision is contemplated. The amputation of rectal prolapses has been remarkably free from fatal results, considering the magnitude of the operation. Only three deaths have been reported from this cause, while a large number have occurred from the so-called conservative or proctoplastic operations. Thus far no deaths have occurred from colopexy or sigmoidopexy; therefore, where the latter operation is feasible, it should be the method of election. Amputation should be considered a method of necessity and not of choice.

Complications of Prolapse.—The different forms of procidentia are not only complicated at times by the existence of neoplasms which have been described as etiological factors, but also by inflammatory conditions, ulcerations, strangulation, archocele, and rupture of the rectal wall. The inflammatory conditions are found in cases brought on by acute inflammatory diseases of the rectum, such as dysentery, summer

diarrhœa, or infectious proctitis in children. They are also found in old cases of extensive procidentia in which the gut remains down much of the time and suffers from friction by the clothing or the opposing buttocks. In the first class of cases the inflammation is a cause rather than the result of the disease, and the subduing of it will finally end in the restoration and cure of the prolapse. In these cases the bowels should be sponged off with a warm solution of hamamelis or fluid extract of hydrastis, a little of the solution being injected well up into the intestine. The prolapse should then be restored and held in position by a properly fitting compress, the patient being kept upon the back. Sufficient opiates should be administered to control the peristaltic action, and a liquid, concentrated diet should be given.

In the second class of cases, inflammations, hæmorrhages, erosions, and ulcerations are due to mechanical irritations and interference with the circulation.

The hæmorrhages are best checked by applications of cocaine or suprarenal extract. The application of cold for this purpose is unadvisable, inasmuch as it is very liable to be followed by sloughing of the parts. The use of persulphate of iron is objectionable, because it forms a hard clot and irritates the intestine. The fluid extract of hydrastis applied in a 50-per-cent solution contracts the blood-vessels, and will prevent the recurrence of hæmorrhages for some time. Where the surface is eroded, a mild solution of nitrate of silver or a 2-per-cent solution of ichthyol in oil, painted all over it, will form a sort of protective coat and give much relief. Where the ulcers are well defined and isolated, a 20-to-50-per-cent solution will be of benefit to stimulate healthy granulation and hasten the cure.

None of these remedies, however, will be permanently useful unless the patient is kept in bed and the prolapse retained inside of the anus. The interference with the circulation caused by the constriction of the sphincter and the œdema of the parts militates against the healing of the erosions and ulcerations. Firm compresses kept upon the anus will sometimes prevent the prolapse from coming down; at other times strapping the buttocks together by adhesive straps is more effectual.

The author has never seen any good come from rectal plugs which pass up through the anus. They increase the relaxation of the sphincter muscles, and simply add to the difficulty which they are intended to cure.

Strangulation is a very rare complication of procidentia. The instances which have been reported have occurred chiefly in traumatic cases in which the procidentia was brought on very suddenly by accident or injury. Ordinarily the procidentia coming on and increasing

gradually, dilates the sphincter, overcomes its spasmodic tendency, and therefore the latter does not produce any constriction. This is true in children as well as in elderly patients. Occasionally, however, acute inflammatory conditions set up in the protruded gut, causing an unusual œdema and swelling, and thus the prolapse is constricted not through any spasm of the muscle, but through the processes going on in itself. Under such circumstances the entire mucous membrane may slough off, or the gut itself may become gangrenous. The reduction of the prolapse under such circumstances is a difficult procedure, and, moreover, it is exceedingly doubtful whether it should be attempted. If it were certain that the mucous membrane alone were involved in the gangrenous processes, it might be perfectly safe to reduce the prolapse. But if the submucous and muscular walls are involved, they will be so weakened that manipulation at reduction may result in rupture; or even if reduction is accomplished without this accident, the gangrenous processes may extend into the peritoneal cavity and thus cause fatal peritonitis. The author is of the opinion that immediate excision of the gangrenous gut is a safer procedure in such cases than attempts at reduction. Where the case is seen before sloughing takes place, efforts at reduction should be made according to the methods heretofore described.

Age is sometimes spoken of as a complication contraindicating attempts at permanent cure of procidentia. Old people cling to life as tenaciously as the youthful, and whatever worries, irritates, or distresses them shortens their days. The author has reported elsewhere a large series of operations upon patients above sixty years of age, and has shown conclusively that in the absence of marked organic disease these individuals stand aseptic surgical operations quite as well as those of forty years (*Jour. of the Amer. Med. Ass'n*, vol. i, 1901). The radical cure of procidentia, therefore, should be undertaken in this class of patients whenever the circumstances call for it.

Another complication is that in which excessively large areas of intestine prolapse through the anus. Instances have been reported in which almost the entire colon and 6 inches of the ileum were protruded. Cumson records the case of a child in which the procidentia extended down below the popliteal space, and Esmarch a case in which the entire large intestine, including the cæcum, protruded through the anus.

The treatment of these extensive procidentiae or invaginations is very difficult. They may sometimes slough off at the point where the upper portion of the gut enters into the lower and thus be cured spontaneously. A specimen in the author's possession shows a portion of the gut which came away in this manner after an extensive procidentia;

it was from a patient of Dr. Thomas, of Georgia. Sixteen inches of the gut came away.

Peacock (*Path. Transactions*, vol. xv, p. 113) reports a case in which it is believed that 40 inches of the intestine came away piece by piece, and yet the patient recovered. Such a result, however, can not be relied upon, as 85 per cent of the cases which have pursued this course have proved fatal. Reduction of these extensive procidentiae, even when seen in their early stages, is rarely possible from the outside. Nevertheless, it should be attempted by gentle taxis and suspending the patient in the knee-chest posture. The author has been able to reduce 1 case, in which the procidentia exceeded 14 inches, after suspending the patient in this position for over two hours. In fact, the procidentia was reduced spontaneously, it being supported and covered with warm cloths during this period. Such results, however, can not be expected with any confidence. Prolonged and violent taxis is likely to inflame the gut and increase its swelling, or it may result in rupture. The question therefore arises, Shall the procidentia be amputated, or shall a laparotomy be done and reduction accomplished through the peritoneal cavity?

Where the condition is seen before sloughing and gangrene take place, the latter course is without doubt the proper one. Under such circumstances amputation not only involves a danger in itself, but also that which would follow upon the removal of so large a portion of the digestive tract. It appears to the author, therefore, that this operation ought never to be resorted to under such circumstances until efforts at abdominal fixation of the gut have been made.

Lambotte (*La presse méd.*, Belge, 1896, p. 25) has demonstrated the possibility of fixing these intussuscepted guts in their normal position. In a child in whom the small intestine prolapsed through the cæcum for at least 15 centimeters (about 6 inches), and the colon and sigmoid prolapsed through the rectum, he made an abdominal incision, reduced the intussusceptions, and sutured the colon in its proper position at the hepatic and splenic flexures, fastening the small intestine along the border of the ascending colon so as to shorten its mesentery, and thus prevented the recurrence of the prolapses. Three months after this operation the patient was seen and was perfectly well. Such an operation as this, or suturing of the colon to the abdominal wall, should be attempted in these cases of extensive procidentia. It is less dangerous, and the probable results are certainly as promising as the excision of large areas of the intestinal canal.

Where gangrene has already begun, cutting away the diseased and protruding portion may be advisable, and may possibly save the patient from septic infection. It is evident, however, that the entire proci-

dentia can not be removed by this method except in cases of the first degree, and the extensive invaginations are rarely of this variety. Operations through the abdomen and peritoneal cavity after gangrene has occurred are not advisable.

Archocele or rectal hernia is one of the most frequent and serious complications of complete prolapse. Ludlow has attempted to show that the majority of prolapses of the rectum are due to rectal hernia; that the *cul-de-sac* of Douglas, being low down and pointed backward, causes an infundibulum into which the small intestines gravitate, and through abdominal pressure sink lower and lower until the gut is invaginated and procidentia is produced. This doctrine has not been established by clinical observations, but every careful observer must have seen cases in which this *cul-de-sac* bulged backward into the rectal ampulla when the patient sits and strains, almost occluding this cavity, and interfering with the fecal movements (Fig. 226). Sometimes in such cases it is necessary for the patient to pass his finger through the anus and press forward the bulging mass before a satisfactory evacuation can be obtained. With such cases in view, one can not positively deny the possible truth of Ludlow's theory.

Kelsey (*op. cit.*, p. 255) says: "In the external form the sac is first formed and remains ready at any time for the reception of its contents," thus indicating his belief that the hernia has nothing to do with the production of the procidentia. This, however, can not be proved or disproved. The fact that rectal herniæ protrude into the ampulla without appearing outside of the anus, certainly indicates the possibility that they may gradually increase just as do scrotal herniæ, overcome the resistance of the external sphincter, and finally cause a procidentia of the gut. The extent of the circumference of the prolapse which is involved by the hernial sac will be determined by the length of the prolapse.

The existence of hernial sacs, however, in all cases of prolapse protruding more than 2 inches through the anus is undeniable. The farther the procidentia protrudes, the larger will be the sac, and the more of the intestinal circumference will it involve. In limited procidentia the hernial sac is restricted to the anterior quadrants, but in extensive ones it may involve the entire circumference with the exception of that part occupied by the mesentery. Herniæ of this type resemble those of the inguinal region, inasmuch as they come down upon walking or straining, are reduced by pressure or position, may become adherent to the sac, or may be strangulated either through spasm of the sphincter or contraction of the hernial neck.

The diagnosis of hernia in procidentia may be made from the thickness of the walls of the procidentia, the gurgling sound upon reduc-

tion, the tympanitic note upon percussion, dragging and gripping sensations in the abdomen when the hernia is down, and the fact that the aperture in the prolapse points either forward or straight downward from the anus. The importance of recognizing this condition in the treatment of procidentia can not be overestimated, for too vigorous manipulation may injure the intestines, and in the operation of amputation the gut might be wounded unless precautions were taken to reduce it beforehand. It is for the purpose of reducing the hernia that the Trendelenburg posture is advised in the operations of Mikulicz and Fowler.

The contents of these hernial sacs are variable. Ordinarily they contain the small intestine, the sigmoid, or omentum. Cases, however, have been reported in which they contained ovaries and tubes, the uterus, the bladder, and the vermiform appendix. All these organs may become adherent to the sac, and thus obviate reduction. The prolapse itself may be pushed inside of the anus, but the hernia will still be unreduced. Brunn (*Casper's Wochenschrift f. d. gesammte Heil-*



FIG. 235.—RECTAL HERNIA PROTRUDING THROUGH ANUS.

kunde, 1883, Bd. ii, No. 40, S. 934) and Pockels (*Catalog. Day's Collegium Anatomical Chirurg., Braunschweig, 1854*) have reported interesting cases of this kind.

A very unusual type of rectal hernia is shown in the illustration (Fig. 235). It was in the person of an old woman in the Almshouse Hospital, and was supposed to be a case of simple rectocele when first

observed. Careful examination of the tumor, however, showed it to be a hernial sac. When the woman strained to move her bowels the tumor would appear, sometimes through the anus and sometimes through the vagina (Fig. 236). The photograph of the tumor prolapsing through the

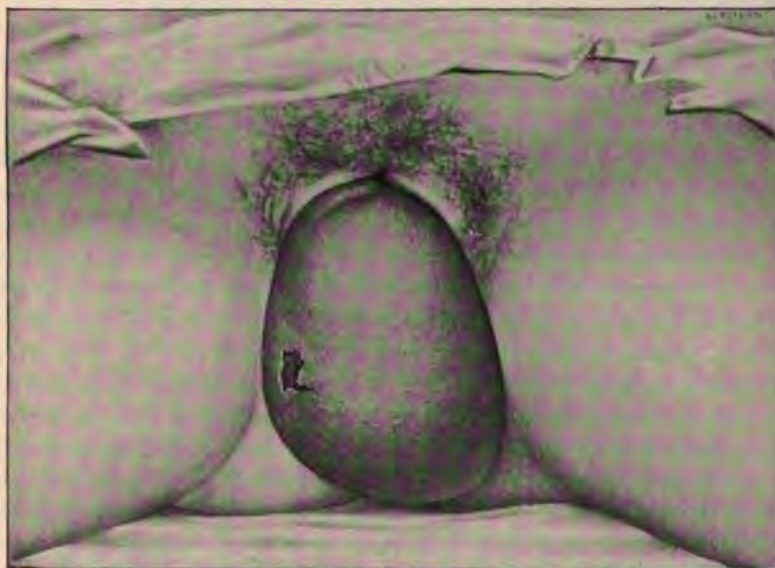


FIG. 236.—RECTAL HERNIA, SAME CASE AS FIG. 235, PROTRUDING THROUGH VAGINA.

anus was obtained by pressure upon the posterior vaginal wall while the patient strained as if to move the bowels. The patient died, and an autopsy was not permitted by her friends, so it is impossible to state exactly what portion of the intestine was included in the hernial sac; but the gurgling sound upon reduction, the tympanitic note, and the fact that the tumor entirely disappeared when the patient was placed in the knee-chest posture, left no doubt as to the nature of the protrusion.

The chief danger from these hernias is strangulation and rupture of the intestinal wall. Strangulation may occur from constriction by the sphincter, the levator ani, or finally by the longitudinal muscular fibers of the gut wall itself. Sometimes these fibers separate, allowing the hernia to protrude between them, the sac being thus composed of only the mucous, submucous, and serous tissues. The spasmodic contraction of the longitudinal fibers, therefore, may cause constriction of the neck of the sac and strangulation of the hernia. Strangulation from spasm of the sphincter is exceedingly rare, and only occurs when unusual amounts of intestine prolapse into the hernial sac and become distended with gas, or when the procidentia becomes inflamed,

oedematous, and thus unnaturally enlarged. It is thus a question of the procidentia becoming too large for the anal aperture rather than one of spasm of the sphincter.

The treatment of such cases consists in reduction of the hernia, if possible, by gentle taxis under the influence of general anæsthesia or large doses of morphine. Some surgeons prefer the latter, holding that it will cause less nausea afterward, which would tend to the reproduction of the hernia. The sphincters should be stretched, or, if necessary, incised, and one should always remember that reduction of the procidentia does not mean complete reduction of the hernia. After the procidentia has been carried upward, a hand should be introduced into the rectum and the parts thoroughly examined to see that no hernial sac containing strangulated intestine protrudes into the rectal ampulla. Where such means fail to reduce the hernia, laparotomy should be performed at once, the contracting bands severed or dilated, and the hernia reduced by the intraperitoneal route. Incisions through the rectal wall under such circumstances are fraught with the greatest danger. The intraperitoneal route is not only less dangerous, but it affords the opportunity for resection of the gangrenous loops of intestine and the breaking up of any adhesions which may have caused the incarceration of the gut. It also has the further advantages that the hernial sac can be obliterated from this side by accurate suturing, and the procidentia can be overcome by abdominal fixation of the sigmoid flexure.

Rupture of the Hernial Sac.—Aside from inflammation, incarceration, and strangulation, cases of rectal hernia may be complicated by rupture of the sac through the rectal wall. This may occur whether the hernia protrudes through the anus or whether it is confined to the rectal ampulla. Kelsey (*Diseases of the Rectum*, 4th ed., p. 240) gives a most interesting collection of cases of this kind. To those interested in the detailed cases, this *résumé* will prove most interesting.

The rupture may occur spontaneously, as has been described by Quénu (*Revue de chirur.*, March 10, 1882), through injury, as in Brunn's case, or through efforts at reduction of the prolapse and hernia. In the case of Smith it occurred during his efforts to cure the prolapse by taking away longitudinal strips of mucous membrane with the clamp and cautery. After the strip had been removed, the patient began to vomit, and the straining upon the parts resulted in a rupture with protrusion of the hernial contents.

Spontaneous rupture due to straining while at stool, vomiting, or lifting heavy weights, is the ordinary course of events. If the prolapse is down, the small intestine or other contents of the hernial sac will protrude from the body itself. If the rupture occurs when there is

no prolapse or protrusion outside of the anus, the gut may prolapse through the wound into the rectal ampulla until this cavity is entirely filled. In either case the appearance of the small intestine or sigmoid with their serous coverings will make the diagnosis clear. The symptoms of such a condition are sudden, acute pain followed by collapse, shock, and protrusion of the gut either into the rectal ampulla or outside of the body.

It requires no elaborate discussion of the pathology of the conditions to account for such ruptures. Whatever weakens the wall of the intestine will predispose to it. Inflammation, erosion, ulceration, fatty degeneration, varicosity, and other pathological changes of the intestinal wall which are likely to occur during the course of protracted procidentia, will easily account for the weakening of the hernial sac and its giving way under any extraordinary strain.

Where rupture occurs while the prolapse is outside of the anus, it has been found that the prolapse itself will be spontaneously reduced. This fact indicates that the hernia has something to do with bringing down and maintaining the procidentia. The rent is variable in the different coats of the rectal walls, generally being longer in the serous than in the muscular coats, and least of all in the mucous membrane. In the cases of Englisch there was marked extravasation of blood between the mucous and muscular coats, and between the muscular and serous coats. In Smith's case the protruded gut was immediately replaced, the rent sutured, and the patient made a good recovery. As a rule, however, strangulation of the protruded gut occurs before operative interference can be employed.

The mortality in such cases is very high, but Smith's experience teaches that, if the parts can be reduced at once, a favorable result may be obtained.

The wonderful case of John Nedham (*Philosophical Transactions*, 1755, vol. xlix, p. 238), quoted in full by Kelsey, is one of those unique accidents in surgery which it is impossible to explain. A boy was thrown underneath a cart (turned upside down), and found in this position with a very large portion of his intestines forced through the anus, a part of the mesentery hanging down between the legs. He was in an intense condition of shock. After hot fomentations the doctor reduced the parts, but the vomiting immediately returned and forced them out. On the following day signs of mortification in the protruded intestine appeared, and on the third day the surgeon cut off the intestine, with the mesentery, close to the anus. Very shortly after this operation there was a discharge of black, offensive, fecal matter, the pains grew easier, the nausea and vomiting ceased, and the patient proceeded to an uneventful recovery. For a while he had six

or seven stools daily, and had some difficulty in retaining them. The doctor is not exactly certain as to what point in the circumference the rupture had taken place, but thought he felt an opening through the posterior wall of the rectum just above the internal sphincter. The intestine cut off measured 57 inches. Three months afterward the boy walked seven miles to dine with the doctor. Such cases as this are surgical curiosities which throw no light upon the etiology or treatment of the condition.

Attempts at reducing the protruded gut in these cases of rupture usually result in crowding the small intestine up into the rectum without restoring it to the peritoneal cavity. Suspending the patient in an exaggerated knee-chest posture may possibly cause the retraction of the gut and enable one to restore it to its proper position. After it has become strangulated and gangrenous, such a restoration would not only be useless but surgically dangerous. If the gut is much distended with gases, large hypodermic needles may be inserted to allow their escape.

In the gangrenous cases it is better to thoroughly cleanse the parts and incise the protruding mass, tying off the segments of gut which are left outside of the anus. Laparotomy should then be performed, and end-to-end union of the healthy gut attempted. The fortunate results of Nedham should not tempt any one to leave the parts protruding, as was done in his case.

If the gut is not gangrenous, it is the duty of the surgeon to perform laparotomy at once and reduce the procidentia from the peritoneal side, having washed off the protruding gut thoroughly with borosalicylic solution before it is withdrawn. After the protruding gut has been restored by this method, the rent in the rectal wall may be sutured from the peritoneal side, if possible; otherwise a gauze drainage should be introduced down to the site of the rupture, and the abdominal wound closed. A faecal fistula may follow this latter course, but it is a matter of small moment, as the large majority of these fistulas heal spontaneously.

The most important point in connection with these ruptures is the likelihood of their being produced by unwise and too vigorous efforts at reduction of the procidentia, and by the cauterizing or denuding operations devised for their radical cure. The likelihood of such accidents should always be borne in mind, and in cases in which the rectal wall is at all diseased, or in which there is evidently a hernial sac in the prolapse, such methods had better be avoided.

CHAPTER XVIII

BENIGN TUMORS OF THE RECTUM

THE lower end of the large intestine may be the seat of a variety of neoplasms that occur at the margin of the anus, in the rectum, or in the pelvic colon; they are broadly classified as benign and malignant, but it is often a very difficult matter to say just where the one ends and the other begins. Growths which in themselves are not dangerous to life may be so gradually transformed that one finds both the benign and malignant types in the same tumor.

From a histological point of view, tumors of the rectum may be classified as follows:

The Connective-tissue Type.—Fibroma, enchondroma, lymphadenoma, lipoma, myxoma, and sarcoma.

The Muscular Type.—Myoma and fibromyoma.

The Epithelial Type.—Adenoma, papilloma, and carcinoma.

In addition to these well-defined types, teratoma or cystoma, fungi, vegetations and excrescences are met with.

Among the tumors of the connective-tissue type are sarcoma, and among those of the epithelial variety, carcinoma. These growths, universally considered malignant, contain no histological elements not found in other growths. The peculiar characteristic upon which their malignancy depends is not understood. The fact that the epithelium in one, and the embryonic cells in the other, develop out of their usual order and location, will not account for the toxic or fatal results in either case. Recent experiments with regard to their bacteriological origin seem to point to a possible solution of this question, but so far the pathologists have not agreed upon whether they are the results of spores, germs, parasites, or toxins. At present only those tumors will be considered which, occurring in the rectum or sigmoid, produce no constitutional disturbances beyond those due to their mechanical irritation and the reflex effects of the same.

Polypus.—The term polypus or polyp is applied to any pedunculated growth. The latter may be of any histological variety so long as it is attached to a surface of the body by a pedicle narrower than the tumor

itself. It is sometimes applied to sessile, pyriform, and pendulous neoplasms in which there is no pedicle, but this use of the term is rapidly becoming obsolete. When one speaks of a polyp of the rectum, therefore, he means a tumor attached to the rectal wall by a pedicle.

Seat and Manner of Development.—Polypi occur with greater or less frequency throughout the intestinal canal. Wellbrock, who has searched the literature on this subject, states that in four-fifths of the cases they are found in the rectum and sigmoid. It is a question whether this preponderance is not more apparent than real, inasmuch as this portion of the intestine is the only one that can be satisfactorily examined during life, and therefore the tumors are seen here when it would be impossible to observe them higher up.

Leichtenstern states that about 60 per cent occur in the rectum, 25 per cent in the ileum, about 12 per cent in the colon and ileo-cæcal valve, and 3 per cent in the small intestine.

In children they are generally observed as isolated growths, one, two, or three in number; most frequently there is only one. In adults, however, we find them multiple in the majority of cases. Their seat is ordinarily about 1 or 2 inches above the margin of the anus, but occasionally they are found much higher. Some have been seen with pedicles as long as 6 inches attached within the sigmoid flexure. The nature of the development is explained as follows: A closed follicle or gland, becoming distended from inflammatory or other causes, protrudes into the cavity of the rectum, carrying the mucous membrane before it, and sometimes dragging a small portion of the submucosa after it. Through its weight, and the contraction of the circular fibers of the gut in Nature's efforts to rid herself of the enlargement, the follicle is forced downward, stretching the mucous membrane, and eventually dragging it out into the shape of a pedicle. The irritation and hyperæmia caused by this sagging, and the obstruction to the return circulation from the growth, bring about an œdema and hypertrophy of the follicle and its surrounding tissues, and thus the polypus is produced.

This method of formation applies to all types of polypi, with the exception that the original growth may be a fibroma, an adenoma, a cystoma, or a lipoma instead of a solitary follicle or gland.

Histological Types.—The neoplasms which most frequently take on this polypoid form are hypertrophied solitary follicles, adenoma, fibroma, and lipoma. The most common form (that which is generally found in children) is of the soft, mucous variety, probably originating in an inflamed solitary follicle. It consists of alveolar tissue, the meshes of which are filled with a thick, viscid fluid; the surface is covered with cylindrical epithelium, and sometimes it contains true Lieberkühn tubules. Occasionally the mucous glands of the intestinal wall are

dragged into the tumor in the processes of formation, and they may appear therein as small cysts. These glands, however, are accidental, and compose only a very small portion of the growth.

The specimen (Fig. 237) was taken from a tumor of this type.

Histological Examination by Louis Heitzmann.—The tumor is composed of a delicate fibrous reticulum, holding chiefly at its points of intersection oblong or round bodies resembling nuclei. In the meshes of the network a gelatinous, at times apparently homogeneous basis substance is found. In the spaces, mostly their centers, lie single, double, or multiple corpuscles of varying sizes, the larger of which contain nuclei. This tumor is rather freely supplied with blood-vessels, most of which are broad and lined with large endothelia, and in their neighborhood the reticulum is narrowest and supplied with a larger number of blood-vessels. Glandular formations are here very scanty. Diagnosis: Soft rectal polyp or myxoma of reticular structure.

This class of polyp differs from the multiple polypi of the rectum in that it contains less fibrous and glandular tissue, and more of the gelatinous or myxomatous material. They are softer to the touch, and are rarely found except in young children. They are more pedunculated, and bleed less easily.

Course and Symptoms.

—The longer a polyp remains in the rectum, the more elongated will be the pedicle; sometimes it passes outside of the anus and is grasped by the sphincter muscle during the act of defecation. They may be torn off and passed along with the fecal mass,

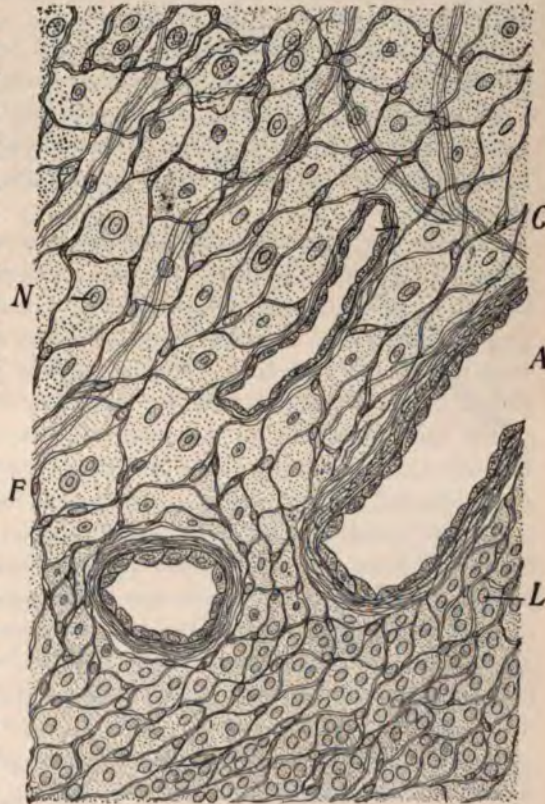


FIG. 237.—MYXOMA, RECTAL POLYP. (Magnified 300 diameters.)

F, delicate fibrous reticulum, with nuclei at the points of intersection enclosing spaces which contain a jelly-like basis substance; *N*, corpuscles, mostly nucleated in the basis substance; *L*, lymph corpuscles; *A*, artery; *C*, capillary.

a slight hæmorrhage resulting, which is rarely if ever serious. There are frequent instances in which children have thrust them out through the anus, and pulled them off, under the impression that they were foreign bodies or something adherent to the anus. So long as they remain well up within the rectum they do not produce any marked symptoms. Patients are not ordinarily aware of their existence until they come down within the grasp of the sphincter or rest upon the sensitive area of the rectum. When they prolapse to this extent they produce a sensation of fulness, with frequent desire to defecate, spasm of the sphincter, and various reflex symptoms.

In one case of this kind which the writer saw with Dr. Lewis, of Jersey City, the woman suffered from constipation, vague symptoms pointing to ovarian disease, and intense nervous exhaustion; the little growth was removed by crushing the pedicle with a hæmorrhoidal clamp, and within a few weeks all the symptoms, except the constipation, disappeared.

To the eye these growths present different appearances according to their pathological nature. The soft mucous polypus or myxoma with reticulum, as Heitzmann describes it, is pinkish or sometimes yellowish-gray in appearance; at other times it appears as a raspberry-like growth with soft, velvety surface. The lipomatous polyp appears as a light-yellow lobulated mass covered by a smooth, shining mucous membrane which may sometimes be ulcerated, but the color of the tumor shows through the membrane. The fibroid polypus is spherical or ovoid in shape, is not lobulated, and is covered either by normal or bright-red and congested mucous membrane (Plate V, Fig. 3). Any of these tumors, if protruded from the anus so that the pedicle is constricted, will present a dark, purplish-red appearance due to the obstructed circulation.

Diagnosis.—The diagnosis of the existence of polypi is very simple; they either protrude from the anus and can be seen, or by examination with the finger they may be felt and recognized. A precaution ordinarily given in examinations with the finger consists in the advice to pass the finger as far up into the rectum as possible, and examine from above downward in order to prevent pushing the tumor upward before it. Generally the tumor will be felt in the ampulla of the rectum just above the sphincter, and, if the rectum is normally collapsed, it may be difficult to pass the finger upward without carrying the tumor along with it. This can be avoided by sweeping the end of the finger rapidly around the rectum so as to excite muscular spasm of the circular fibers, which will force the tumor down while the finger glides up alongside of it. After the finger is once above the growth, if the pedicle is long enough one can bring it into view by pressing it firmly against the side of the rectum and slowly dragging it downward.

When polypi are above the reach of the finger, or slip up in front of it, they may be seen and grasped through the proctoscope. Through the instrument and by electric light they appear as pink or gelatinous masses attached to the wall by a bright-red cord. This cord is usually about the size of an ordinary shoestring, but it may be much larger. Grasped between the fingers they usually feel soft and pliable, but occasionally firm and fibrous. One can generally feel the pulsation of the afferent artery, but this is not uniformly the case.

Treatment.—The treatment of these growths consists in snaring them off with an ordinary rectal snare (Fig. 238), or if they can be grasped and pulled down, a ligature may be applied around the pedicle and the tumor snipped off below it. If the patient is anæsthetized, the pedicle may be crushed with the hæmorrhoidal clamp, the tumor cut off, and the stump cauterized. In children, however, anæsthesia is frequently unnecessary, inasmuch as the pedicles are devoid of nerve fibers, and one may drag down the tumor and apply a ligature or crush the pedicle without any pain. Occasionally these little tumors are attached by a broad band of mucous membrane,



FIG. 238.—LADINSKI'S RECTAL SNARE.

which, if it is simply cut off, will leave quite an ulcerative space; in such cases it is better to cut the tumor off and suture the edges of the mucous membrane together with fine catgut. This is a very rare condition in single or mucous polypi, but in papillomata and adenomata with broad attachments, the precaution is very important, inasmuch as it is the only method by which the entire growth can be removed, and the danger of recurrence in a malignant form be reduced to a minimum.

Where the pedicle is very slender it may be caught and twisted with little tension until it is loosened from its attachment, but there is always risk of tearing the mucous membrane of the gut by this method, and if there should be an invagination of the peritonæum into the pedicle this might be opened.

No dressing is necessary after such an operation. The bowels should be encouraged to move regularly, and the rectum should be irrigated with antiseptic solutions daily for one week, after which time the parts will probably be well.

The other types of tumors which assume the polypoid shape will be considered under their proper histological classification. The pedun-

culated form is only a morphological characteristic due to the elasticity and mobility of the tissues in which they develop, and to the peristaltic efforts of the bowel to rid itself of an abnormal object. Thus the significance and importance of a tumor of the rectum depends entirely upon

the growth at the end of the stem, and not at all upon the polypoid shape.

Fibroma.—True fibromata of the anus and rectum are exceedingly rare. They have their origin in the connective tissue of the submucosa, sometimes grow to considerable size (Fig. 239), and may be solid or cavernous. They may remain in the rectal wall or they may assume the form of polypi.

Bowlby (Transactions of the Pathological Soc. of London, 1882, p. 107) has recorded the case of a woman who, while at stool, forced out from her anus a tumor of this variety as large as a foetal head. It was attached by a pedicle to the anterior wall of



FIG. 239.—FIBROIDS OF THE ANUS AND RECTUM.
Drawn from photograph taken before operation, 1894. Nine distinct tumors were removed.

the gut 4 inches above the anus, and weighed nearly 2 pounds. On microscopic examination it was found to be composed almost entirely of pure fibrous tissue. The pedicle was simply ligated and clamped off below the ligature, and the patient made an excellent recovery.

Barnes (Brit. Med. Jour., 1879, vol. i, p. 551) described a tumor of this variety as large as an orange, which he removed by means of a galvanic loop. The tumor itself was composed of fibrous tissue, and was cavernous in some portions.

Pathology.—A pure fibroma consists of fibrous tissue arranged in

wavy bundles, and ordinarily containing very few blood-vessels, but in this respect there is considerable variation. Most of those removed are of the mixed variety, and contain more or less muscular, glandular, and connective tissues.

Thus what is ordinarily known as a fibrous polypus of the rectum is not in reality a true fibroid, but a polypoid tumor in which the fibrous tissue in varying amount is mixed with glandular and other elements. In these cases the fibrous tissue does not run in wavy bundles, but extends in all directions, and gives to the tumor its density, hardness, and weight. Owing to the size and heaviness of such growths, the pedicle is much dragged upon, and consequently becomes very weak and slender. It may be ruptured, and the tumor brought away by the friction of the faecal passages or by the peristaltic action of the intestines. The size of the tumors varies from that of a small hazelnut to that of a coconut; ordinarily they are somewhat elongated, and about the size and shape of a small olive.

Symptoms.—Fibrous tumors of the rectum as a rule do not occur in children; they are hard and sometimes nodular; the mucous membrane covering them is somewhat thickened, and occasionally it may be ulcerated, owing to the pressure of the faecal mass or to the friction produced by the tumor moving up and down in the intestinal canal. Sometimes the glandular elements in these tumors contain more or less fluid or jelly-like mucus; when this condition exists, the tumor is termed a colloid polypus. The transformation or degeneration of these tumors is very rare, but it is said to occur, and when it does, a sarcoma is the result.

When the fibroma remains in the intestinal wall it assumes the form of a spherical or ovoid mass closely attached to the muscular coat, and the mucous membrane is movable over it. Its seat may be anywhere in the tract from the margin of the anus to the stomach. Fig. 239 is drawn from the photograph of a case of multiple fibroids of the anus occurring in the writer's practice.

The other symptoms are similar to those of mucous polypi. Those in the wall of the gut give rise to dull, aching pain, tenesmus, frequent defecation, and sometimes ulceration of the mucous membrane. The absence of hæmorrhages and mucous discharges distinguishes these growths from other types of polypi.

Enchondroma.—One of the rarest tumors of the connective-tissue variety occurring in the rectum is that known as enchondroma. Only two instances have been reported. Van Buren (*op. cit.*, p. 268) recorded a case of this type, and recently Dolbeau (*Bull. de la soc. anat.*, t. v, p. 6) has reported a case. The tumor which was removed from the rectum of a man aged twenty-seven was about the size of a small walnut.

Histologically it was composed of cartilaginous and fibrous tissue. In some portions, however, it appeared to be of an adenomatous nature, and therefore could not be considered a pure enchondroma.

Lipoma.—Tumors composed of adipose tissue are found in the rectal cavity, and also higher up in the intestinal canal; when they occur in the rectum, they ordinarily develop from the submucous layer of the intestinal wall; higher up, however, they sometimes arise from the subperitoneal fat.

Ordinarily these tumors are closely attached to the rectal wall, but they may also assume a polypoid shape, and the pedicle may attain the length of 5 or 6 centimeters ($2\frac{3}{8}$ inches). They are composed of moderately firm, lobulated masses, consisting of fatty cells enclosed in a fibrous stroma varying in amount; they are only very slightly vascular, and may grow to a size which may obstruct the canal.

Castellane (*Gazette hebdomadaire*, 1870), quoted by Mollière, records the case of a man aged forty-three, who passed from his rectum an ovoid tumor 12 centimeters ($4\frac{3}{4}$ inches) in length by 6 centimeters ($2\frac{3}{8}$ inches) in width, of a firm consistence, pink color, and lobulated. The tumor was attached by a pedicle 3 centimeters ($1\frac{3}{8}$ inch) in length, and composed of pure lipomatous tissue.

Tedenat (*Montpellier Med. Jour.*, 1885) operated upon a lipoma of the rectum 13 centimeters ($5\frac{1}{8}$ inches) in length and 6 in depth, which was attached by a pedicle the size of the index finger inserted 12 centimeters ($4\frac{3}{4}$ inches) above the anus. This tumor, which entirely occluded the rectum, was removed by an *écraseur*. The mucous membrane covering the growth was thickened, œdematous, and ulcerated. Bernard (Mollière, *op. cit.*, p. 525) has recorded a similar case.

Virchow (*Path. de tumeurs*, vol. i, p. 379) has recorded a case in which there was an invagination of the colon into the rectum due to two submucous, pedunculated lipomata. Each of these tumors was about the size of an egg. Esmarch, Bose, Broca (*Archiv f. klin. Chirurg.*, 1876), Afezon (*Bull. de soc. d'anat.*, Paris, 1875), have all recorded similar cases. Voss has reported a case in which the tumor, situated in the rectal wall, caused a prolapse of this organ, and was thus protruded through the anus when the bowel moved. He split the mucous membrane and enucleated the tumor, after which the prolapse disappeared.

Spencer Wells (*Transactions of the Path. Soc. of London*, vol. xvi, p. 277) speaks of the occurrence of lipomata in the recto-vaginal septum. Molk (Thesis, Strasburg, 1868) described a number of perineal lipomata, some of which were pedunculated and others not. Roberts (*Annales de thérap.*, 1844) gives the history of a man upon whom he operated for what he considered a perineal hernia, but which he found to be a lipoma originating in the ischio-rectal fossa.

The author has seen two cases of lipoma of the rectum and one of the anus. One of those in the rectum assumed the polypoid form, and was attached to the anterior wall about 4 inches above the anus. The other tumor was located in the rectal wall just in front of the sacrum. This tumor was lobulated, about the size of a small hen's egg, and was supposed to be a dermoid cyst. An incision was made in the mucous membrane, and the tumor enucleated; it proved to be a pure lipoma, and, so far as could be judged, was confined between the muscular and mucous layers of the gut.

Tumors of this class occasionally occur outside of the rectum, and yet attached to its walls, occasioning by their pressure tenesmus and obstruction of the canal.

Vorchung (Transactions of the Path. Soc. of London, vol. xv, p. 100) has reported a case of this kind seen in a woman who had suffered during life from retention of fæces and difficulty in urination. She died from mechanical obstruction to the passage of urine. Upon post-mortem there was found a lipoma in the pelvis completely surrounding the rectum, and firmly attached to its outer walls. The growth entirely obstructed the two ureters, and almost completely occluded the rectum.

When such tumors are attached by pedicles inside of the rectum, they are very likely to be torn off as other polypi are; the pedicle may be twisted, and on account of the circulation being impaired becomes friable and easily ruptured.

Where the tumors are large and the pedicles extensive, there may be funnel-shaped invaginations of the peritonæum into them. This, of course, occurs when the pedicle is attached to the anterior or lateral portions of the rectum or sigmoid. Ball (*op. cit.*, p. 298) states that this fact, together with the history of most of these tumors having descended from the sigmoid flexure, tends to show that they originate in the appendices epiploicæ, which have become inverted, and are thus carried downward into the rectum in the shape of polypi. There is little ground for this theory, as the tumors have never been shown to be surrounded by the remains of a peritoneal membrane, which would necessarily be the case were their origin such as Ball suggests.

Treatment.—The removal of these tumors when pedunculated should always be carried out by the use of the ligature, owing to the possibility of peritoneal invagination into the pedicle. If they are cut off with scissors or torn loose recklessly, these little infundibular invaginations may be opened, and thus connect the peritoneal cavity with that of the rectum, which must inevitably result in septic peritonitis.

The snare and wire *écraseur* and the clamp are none of them suitable in such cases. Where the tumor is situated in the rectal wall and is

not pedunculated, it should be removed by incision of the mucous membrane, enucleation, and, if possible, suturing of the wound.

Myoma.—Tumors composed of muscular or combined muscular and fibrous tissue occasionally occur in the rectum. They arise from the muscular coat—generally the longitudinal layer—and assume a nodular form supplied with a pedicle, or sometimes they exist as broad tumors lying in the muscular wall of the intestine and covered by the submucous and mucous coats. They are ordinarily classed among the leiomyomas and are composed of unstriped muscular fibers. Microscopically they consist of great numbers of muscular fibers separated by a connective-tissue network. Where the fibrous tissue exists in any considerable quantities, the tumor may be called a fibromyoma. They are not markedly vascular, the capillaries ordinarily running in the fibrous stroma of the growth.

Tedenat (*op. cit.*) has described myomata which he removed from the rectum of a man in whom they caused hæmorrhages and mucous discharges. De Carlier (*Jour. de med. chirur. and pharm. des Bruxelles*, 1881, p. 140) successfully removed a tumor from the rectum which was found to be a pure myoma. Heurtaux (*Archives provinciales de chirur.*, 1896, p. 189) has recorded similar cases.

Berg and Senn, cited by Westermarck (*Centralblatt f. Gynäk.*, 1896), have reported cases in which they have removed fibromyomata from outside of the rectum, but closely attached to this organ. In Berg's case the tumor filled the hollow of the sacrum, and was closely attached to the rectal wall, the mucous membrane of the gut being inflamed, thickened, and ulcerated. The growth was removed by the Kraske operation. In Senn's case the tumor partially filled the pelvis and was closely attached to the anterior wall of the rectum. Westermarck himself reports a similar case in which the anterior wall of the rectum was ruptured during the operation, and death followed on the fourth day from peritonitis. In his case, however, microscopic examination showed the tumor to be a pure fibromyomata, originating in the longitudinal, muscular fibers of the gut. McCosh (*Annals of Surgery*, 1893, p. 41) operated upon a tumor of this kind which was situated outside of the gut and attached to its posterior wall. He found it necessary to perform a preliminary colotomy, after which he removed the growth by a shallow incision, at the same time excising the coccyx and removing a part of the wall of the gut to which the tumor was attached. His patient made a good recovery.

These tumors, however, are quite rare, and it is impossible to determine their nature without a thorough microscopic examination. If they are small and confined to the rectal wall, the hard, nodular surface may frequently lead one to the diagnosis of scirrhus cancer.

Treatment.—The only thing to be done with such growths is to remove them. If feasible, this should be done from the outside of the rectum. When the mucous membrane is freely movable over the tumor and the latter is not more than 4 inches above the anus, this can generally be accomplished. After it is done, the muscular wall of the gut from which the tumor is excised should be sutured as accurately together as possible. If done within the rectum, great care should be exercised to furnish free drainage to the parts even if complete posterior proctotomy has to be performed to accomplish this.

Lymphadenoma.—This type of growth is occasionally found in the rectum. It develops from the lymphoid tissues or solitary nodes which exist throughout the large intestine. It is soft to the touch, and may attain a considerable size. It consists of a reticulum formed by branching cells united by their prolonged extremities. Within the meshes thus formed there lie round cells with circular nuclei. Stengel states that the cells are less uniform in size than those of the normal lymphatic glands, and large cells are in abundance.

Felizet and Brancha (*Traité des malad. de l'enfance*, 1897, t. ii, p. 747) state that in these tumors there are two zones, the peripheral, composed of mucous membrane from which the glandular *culs-de-sac* have disappeared, and the central, composed of irregular lobules separated by connective-tissue bands. In the delicate reticulum are found various-shaped leucocytes and capillaries, the lumen of which is separated from the adenoid tissue by a thin ring of connective tissue.

Quénu and Hartmann state (*op. cit.*, vol. ii, p. 361) that these growths are usually pedunculated, and cite cases from Schwab (*Beitr. z. klin. Chir.*, Bd. xviii, S. 2), M. Broca, Shattock (*Trans. Path. Soc.*, London, 1890, p. 137), and Branca (*Bull. de la soc. anat.*, Paris, 1897, p. 158) to corroborate this view. In the author's case there was no pedunculation whatever. Ball (*op. cit.*, p. 321) describes a tumor of this kind, but states that upon minute examination it proved to be a lympho-sarcoma. He states that a number of such growths have been recorded in connection with Hodgkin's disease. It is important, therefore, to know that we are not dealing with sarcoma before giving a prognosis in such cases.

Symptoms.—Lymphadenoma present no other symptoms than those of a single polyp. They may prolapse and produce mechanical irritation of the rectum, but they do not bleed freely, and discharge no mucus or pus. A glairy mucous discharge may be associated with them, but this is due to a catarrhal proctitis excited by the pressure of the neoplasm. The tumors are slightly lobulated, always single, of a bright-red color and soft consistence.

Treatment.—The treatment consists in their radical removal by surgical measures. The cases recorded are too few from which to draw

any general conclusions, but so far those not exhibiting sarcomatous changes have shown no tendency to recur, and the parts have healed promptly after operation.

These tumors have been put down by authors generally as of a benign nature, but both Stengel and Ziegler consider them as frequently malignant. Complete and wide removal should therefore be made.

Myxoma.—This type of tumor consists of a soft and more or less flabby growth enclosed by a thin capsule, and has a spherical outline.

It may assume the polypoid shape, or occur as a semispherical protuberance in the rectum. It is composed of stellate, irregular cells and a gelatinous intercellular substance. Occasionally it is lobulated, but ordinarily its surface is quite smooth.



FIG. 240.—MYXOMA (Stengel).

It is rare that a pure myxoma is ever found, the myxomatous being usually mixed with fibrous, fatty, cartilaginous, or sarcomatous tissue. Microscopically these tumors consist in a homogeneous, somewhat glandular tissue, with surfaces due to the refraction of the light. An excess of the round, granular cells sometimes gives the appearance of a myxo-sarcoma.

Within this mass of myxomatous tissue there lie stellate, spindle-shaped, connective-tissue cells (Fig. 240). According to Stengel, the vascular supply is poor, and the blood-vessels are only partially developed. Ziegler, however, states that the tissue is translucent, and the blood-vessels are plainly visible when they are filled with blood.

The soft rectal polypi of children are practically myxomata. Hulke (*Med. Times and Gaz.*, vol. ii, p. 1066) has recorded a case of myxoma in which the tumor surrounded the rectum and anus, almost occluding the canal. It was entirely outside of the gut, however, and occupied the perinæum and ischio-rectal fossæ.

Adenoma.—The term adenoma as applied to the rectum is ordinarily considered synonymous with polypus. The fact that a large number of rectal polypi are of the adenomatous variety, and that even multiple adenomas assume the polypoid shape, has led many to consider these two conditions identical, but this is not the fact. Almost every tumor of the rectum may become polypoid, but this has nothing to do with its pathological nature. It is only one variety of polymorphism to which neoplasms are subject in a movable and loose tissue. All polypi are not adenomas, neither are all adenomas polypi.

The earliest descriptions of adenomas of the rectum date back to the sixteenth century. Leautaud, Lange, Schmucker, Felizet, and Branca described them in 1760; the first accurate description was given by Stoltz in 1841, who afterward published a most interesting article on the rectal polypi of children (*Gaz. méd. de Strasburg*, 1859, p. 157, and 1860, p. 7).

In recent years Ball, Bardenheuer, Cripps, Kelsey, Luschka, Tanchard, Weichselbaum, Dalton, and others have made careful pathological examinations and studies of these conditions. Quénu and Hartmann have gone very carefully into the subject, and to those interested in the minute pathology their work will be of exceeding interest. It is too detailed and technical, however, for the general practitioner, who must depend finally upon the pathologist to decide upon the histological nature of neoplasms.

Adenomas develop from the mucous and submucous coat of the rectum. Quénu and Hartmann state that they do not extend below the muscularis mucosa; Cripps, on the contrary, holds that they involve the entire thickness of the mucous membrane and submucosa. At any rate all the elements composing these layers, the epithelial, the tubular, the fibrous, and the glandular constituents, are found in them.

The tumors may occur singly or multiple. In children there are ordinarily only one or two, and these are of a distinctly polypoid form with pedicles of considerable length. In adults, however, they are generally multiple, and the pedicles are not so marked.

Histologically, the single tumors found in children consist of a greater amount of connective or fibrous tissue in proportion to the glandular and epithelial structures. In the multiple tumors, found chiefly in adults, the proportion is reversed, and there is an excess of the epithelial and glandular elements in proportion to the connective-tissue stroma. On this account adenomas of the multiple variety approach more closely the epitheliomatous or cylindrical carcinomatous type than do the single adenomas of childhood.

Simple Adenomas.—They occur most frequently in children from one to twelve years of age, although they are occasionally seen in adults. The tumors vary in size from a small cherry to that of a hen's egg, or even larger; there may be only one or there may be three or four. Between this number and multiple adenoma there is no middle ground.

Cases have been reported by Kaemm, Ball, and others in which a single adenoma reached enormous size and weighed as much as 4 pounds. Quénu and Hartmann, in an examination of 15 cases, observed none of them larger than an ordinary nut. In the author's experience one single adenoma as large as a hen's egg has been seen; the rest of them varied in size from a small pea to that of an English walnut.

In a case of multiple adenoma, however, one of the growths absolutely filled up the caliber of the gut. In the single variety, in which the polypoid form is marked, the pedicles may measure from 1 to 4 or 5 inches in length; in 1 case, after ligating it 3 inches above the anus, the pedicle could be felt dangling down in the rectum from above. Although no accurate measurement was made, it was apparently 5 or 6 inches long. The size of the pedicle varies with the age and size of the tumor. Where the latter has existed for a long time, and has been gradually dragged upon and stretched, the pedicle becomes much attenuated. Ordinarily it may be said to be about the size of a round shoestring, or in proportion to the tumor, about $\frac{1}{4}$ of its diameter. The tumors appear to the naked eye as spherical knobs upon the end of the stems. They are oval in form, bright red, and resemble very much a large red raspberry. The mucous membrane covering the stem or pedicle is normal with the exception that the tubules are decreased and the epithelium is somewhat atrophied. Within the pedicle the fibrous core or center passes in longitudinal layers through its tissues until it reaches the tumor, at which point these fibers branch out, forming a sort of arborescent growth. These branches form the center or base of the lobes composing the tumor. According to the observations of Quénu and Hartmann, this fibrous stalk and branches appear to grow from the septa between the Lieberkühn follicles, and not to proceed from the submucosa. From the fact that we very rarely find muscular fibers in the stalks, it would seem that these observations are correct, but Cripps does not accept them. He believes that they grow from the submucosa. The blood-vessels proceed directly from the submucosa, and can be traced downward into this tissue. From each of the fibrous stalks which branch off to form the lobules, fine branches pass outward, forming a sort of reticulum upon which the epithelial cells that practically compose the tumor rest.

The epithelium covering these stalks is always of the columnar variety, and composed of goblet and cylindrical cells, the nuclei of which are ordinarily near the base. The epithelium is arranged in a single layer more or less closely packed together, and, according to Cripps (*op. cit.*, p. 288), is always continuous with the epithelium covering the stalk, and through this with that lining the intestinal canal. The firmness and vascularity of the tumor will depend upon the amount of fibrous tissue in the stalk and the length of its ramifications. Where the fibrous tissue is small and the ramifications very long, the tumor will be soft, vascular, and bleed very easily.

Alterations in the volume, diameter, and shape of the tubules occur owing to inflammatory processes and pressure. Those nearest normal will be found at the pedicle, and gradually increasing alterations will

be more and more marked as one proceeds toward the periphery of the tumor. Variations in form and height, the predominance of muciparous cells and degeneration of the protoplasm and nuclei, characterize the changes in the epithelium of these growths. In some cases the outlines of the cells are not at all visible, they are simply recognized by numerous nuclei surrounded by an indistinct protoplasm (Quénu and Hartmann, vol. ii, p. 34).

The surface epithelium is frequently absent, owing to the friction of the fecal masses and the rubbing up and down of the tumor against the rectal wall. In the depressions and near the attachment of the pedicle, the normal epithelium of the rectum is ordinarily found. The connective tissue of the tumor itself presents a fibrillary appearance composed of young cells, and resembling very much the chorion of the mucous membrane. It varies greatly in quantity. In some it is very marked and gives the tumor a firm, hard feeling; in others the glandular acini and tubules are relatively large, and give it a soft, cystic appearance.

These tumors may undergo secondary degenerative changes, such as hyaline, myxomatous, or cystic degeneration, under which circumstances they would be called cylindroma, adeno-myxoma, and cystadenoma.

While adenomas are ordinarily considered benign growths, they are said in some cases, even in their pure form, to give rise to metastasis. They have no effect upon the general health in themselves, although this may be influenced through their local irritation and interference with the normal functions, or through ulceration and hæmorrhage.

Symptoms.—Simple adenomas nearly always assume a polypoid form, and the symptoms are identical with those of other polypi, except that they bleed more easily. The important points are, that in adults where one is found many others are likely to exist, and after removal they are likely to recur.

Treatment.—The treatment of this type of tumor is very simple. They may be twisted, tied, crushed, or snared off. It is not necessary that the pedicle should be caught close to the wall of the gut. Any remaining stump will atrophy and disappear if all the adenoid tissue is removed. If the growth is sessile or attached by a broad pedicle, it should be removed by wide incision through the mucous membrane down to the muscular wall, and the edges of the wound should be sutured together by catgut.

The possibility of invagination of the peritonæum into the pedicle should always be remembered, and on this account, if the tumor is high enough for this to occur, it should be tied off with a strong silk ligature.

Multiple Adenomata.—In adults, and occasionally in children, the rectum, sigmoid, and the entire colon may be the seat of multiple ade-

nomata. The symptoms, course, and pathology of this condition differ in many respects from those of simple adenomata, and justify a distinct consideration. Virchow (*Die krankhaften Geschwülste*, 1863, Bd. i, S. 243-244) has described it under two titles: "Polypi of the large intestine" and "polypoid colitis." In these papers he does not seem to have recognized the rectum as a seat of the disease. Cripps speaks of it as disseminated polypi of the rectum, but does not connect it with the sigmoid or colon.

There have been very numerous reports of cases of this type, especially during the last few years (Whitehead, Cripps, Gerster, Kelsey, Ball, White, etc.). We are indebted to Quénu and Landel (*Revue de chirurgie*, 1899, tom. xix, pp. 465-494) for the most exhaustive review of the subject, and an excellent pathological report of 2 cases occurring in their own practice. In their paper 42 cases are collected, most of which have been observed since 1884; previous to their studies, surgeons generally considered these tumors as identical with simple adenoma or polypus of the rectum. They have pointed out, however, not only a difference in the ages at which the two conditions occur, but also certain histological and pathological variations between the simple and multiple growths that render this view of identity untenable.

Etiology.—A certain number of surgeons and pathologists seem to believe that multiple adenomata originate in the simple type; there is no case reported, however, in which a single or simple adenoma, recognized during childhood, has ever developed into the multiple variety in after years. In all the cases observed so far, not one has been reported in which a single isolated tumor was found in the beginning and followed by the development of numerous others afterward. Wherever a clear and distinct history is furnished, there has been observed in the beginning numerous neoplasms similar in size and stage of development. There is therefore no ground to believe that the single or simple adenomata of children are predisposing causes of multiple adenomata in adult life.

Age.—While there are a few cases of the multiple type reported in children, it is especially a disease of adult life. Of the 42 cases collected by the authors mentioned, over 50 per cent of them were between twenty and thirty-five years of age; 4 cases occurred below sixteen, and 8 above forty-five years of age. The author has observed 6 cases, 3 in his own and 3 in the practice of colleagues, all of which were between twenty and forty years of age; it seems, therefore, to be a disease of middle life.

Sex.—There appears to be a slight preponderance in favor of the female sex. In the author's cases, 2 were in women and 1 in a man; in those seen through the courtesy of Drs. Gerster, Ladinski, and Thomp-

son, all were in women. There is no reason, however, to believe that sex exercises any etiological influence.

The exact cause of adenoma is not well known. They consist in an inflamed hyperplasia of the normal glands of the rectum. Whether this inflammation may occur *in utero* has not yet been determined; but in view of the fact that they are sometimes observed very early in life, it would seem that such was possible.

Heredity has some influence, as was pointed out by Esmarch, but inflammation or irritation is generally accepted as the chief cause. The action of certain parasites, such as distoma hæmatobium, and microbic infection of the glandular tissues, have also been accused of having an etiological influence. Francis Huber, of New York, has recently made an elaborate study of this subject, and shows that a large number of children suffering from postnasal adenoids also suffer from rectal polypi. He argues that they all belong to that class of cases in which there are lymphoid hypertrophies and "other manifestations of the constitutio lymphaticus, status lymphaticus."

In children there is no doubt that there is some ground for such belief, but, so far as adults are concerned, there is no proof that adenoids of the intestinal canal are in any way related to those of the respiratory apparatus. While the growths in the rectum and in the nares resemble each other somewhat, this resemblance does not amount to an identity by any means. The fact that rectal adenoids are so frequently transformed into carcinoma, and this transformation is rarely if ever seen in the postnasal growths, would lead one to conclude that there was a very distinct difference between them.

Huber's argument is interesting, but it will require a very much larger series of cases to prove that all adenoids of the rectum are the result of general lymphatic hypertrophy.

Distribution of the Growths.—The condition is said by some to be an affection of the colon and not of the rectum; yet, as a matter of fact, they are rare in the intestinal canal unless the rectum and pelvic colon are also involved. In the majority of cases they are as numerous and large in these portions of the tract as elsewhere. In 50 cases, adenomata existed in the rectum in at least 48; they were confined to this portion in 15; in 11 they were only in the rectum and sigmoid; in 13 (Quénu and Landel) they occupied all of the colon; in 3 the entire intestine and stomach, and in 2 the colon only. From these figures it would seem that the rectum is the portion of the intestinal canal most frequently affected.

Fink states that they begin in the rectum and gradually multiply upward; they are sometimes grouped in certain regions, and seem to be restricted to these; in some cases aggregations exist in the rectum or

in the sigmoid and in the transverse colon, with three lengths of perfectly healthy mucous membrane between them.

The sites at which they most frequently occur in great abundance are those at which the fecal mass is accustomed to be arrested. This fact gives color to the theory that they are due to irritation or infection of

the glands by the fecal material.

Conformation.—The tumors vary exceedingly in size, form, and appearance. They may be smooth, round, and shiny, or rough and wart-like, resembling a raspberry (Fig. 241); they may be spherical, elongated, or even cylindrical in their shape, sometimes resembling the tail of a large lumbricoid worm (Fig. 242), and their size varies from that of a hempseed to a good-sized egg. In some cases the pedicles of the different tumors may be confluent, forming one general stem from which several tumors shoot out like grapes in a bunch.

The author saw a case of this kind some years ago, in which the mass of adenoids was



FIG. 241.—MULTIPLE ADENOMATA OF THE RECTUM.

as large as one's fist, and the pedicle as large around as the wrist, though soft and without induration. It was attached about $2\frac{1}{2}$ inches above the anal margin, and the mass was so large that he was unable to introduce his finger far enough to determine whether there were any other adenomas above it or not. The patient was a timid soul, and, refusing an operation, disappeared from the clinic.

The tumors may also occur in the papillary form in which the villi

are very much exaggerated, bulb-shaped, and resemble the so-called villous tumor.

Color.—The color of the growths depends very largely upon the stage and the part of the intestine in which they are seen. If they are loose in the rectum and of comparatively young growth, they appear bright-red, yellowish, or sometimes, owing to their being coated with mucus, a sort of reddish gray. If they are old and inflamed they assume a dark, purplish-red color, and one frequently sees points of abrasion or ulceration upon their surfaces.

When they are protruded from the anus, owing to the torsion or strangulation of their blood-vessels by the sphincters, they appear dark, purplish-red, or even black, approaching the stage of gangrene.

Consistence.—The tumors themselves may be soft or hard, according to the amount of connective-tissue stroma and the extent to which car-

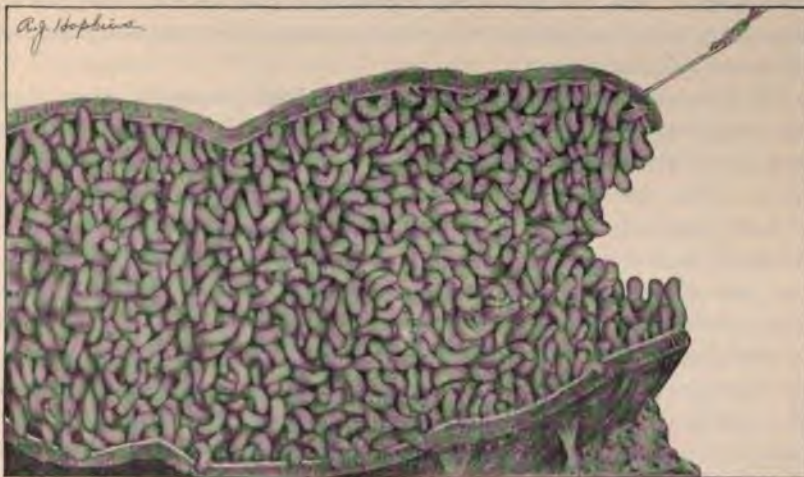


FIG. 242.—HYPERTROPHIC FOLLICULITIS OF RECTUM AND COLON (Lillenthal's case).

cinomatous transformation has taken place. The harder the tumor, as a rule, the more likely is it to have undergone such transformation; but occasionally this is not true, because these little growths may undergo cystic degeneration, in which the malignant transformation assumes the type of colloid cancer; they may also be very firm from inflammatory or fibroid changes. Transformation can not therefore be predicated upon consistence alone.

The Pedicle.—This is formed by mucous membrane, fibrous and submucous tissue, and blood-vessels. The medium-sized tumors have longer and narrower pedicles than the small or large ones. The very small tumors are generally sessile, while the large ones are attached by thick, short pedicles which render them almost so. The pedicles are

never so long in the multiple as in the simple variety. When transformation has occurred they become dense, hard, and short.

Condition of the Mucous Membrane.—There is always more or less proctitis or colitis along with this condition. Authors differ with regard to the nature of this change in the mucous membrane. Desnos says that the mucous membrane is reddened and thickened, while Hauser states that it is injected and atrophied. Quénu and Hartmann explain this by saying that in the case of the former it was a simple undegenerated adenoma, whereas in the latter they were all cases in which carcinomatous transformation had taken place.

The pathological examinations of Quénu and Landel show that in the whole extent of the colon, and far away from the carcinoma, there was an atrophy with a partial destruction of the glands of the mucous membrane and infiltration of the connective tissue. The capillaries were dilated and the glandular epithelium had almost disappeared. Strange to say, these lesions were less accentuated in the neighborhood of the polypi themselves.

In the cases which the author has examined personally, there have always appeared clinical evidences of hypertrophic proctitis, with an increase of the secretions and general congestion of the mucous membrane. Until he had read the report of the authors above mentioned, he had supposed this catarrhal condition was due to the irritation of the mucous membrane by the neoplasms; but, accepting their report as true, one must conclude that the changes are of a trophic nature rather than due to any mechanical irritation.

Symptoms.—The symptoms of multiple adenoma of the rectum may be stated in four words: diarrhœa, hæmorrhage, pain, and exhaustion. The diarrhœa, which is at first slight, is always annoying by its frequency, tenesmus, and griping pains. It is not ordinarily associated with fever or constitutional derangements, but it is uncontrollable by any remedy short of complete narcosis.

Camphor, tannic acid, opium in moderate doses, and all the astringent medicines are absolutely powerless to control this condition.

The stools are small, soft, and always contain mucus, with more or less fresh or decomposed blood. In the latter case the color is black and the odor very disgusting.

The hæmorrhages are at first very slight, occasionally there is only a tinge of blood to the mucus, but as the disease progresses these become more marked, and the stools may be composed almost entirely of blood and mucus. Occasionally mucus alone is discharged, slightly tinged with blood.

The amount of pain which the patients suffer depends upon the location, number, and size of the adenomata. Where they are dis-

- tributed throughout the colon, tenesmus, bearing-down pain, and digestive disturbances are common. Where they are largely confined to the rectum and sigmoid, the patients do not suffer very much. When the tumors grow to be so large that they obstruct the passage of faecal masses, then the pain becomes more severe. This is not only due to the mechanical obstruction, but sometimes to the carcinomatous change which takes place in these neoplasms, and the consequent fibrous narrowing of the caliber of the gut.

Prolapse of the rectum is occasionally associated with these growths, and, when dragged down and strangulated, may be the source of a great deal of pain, and even a fatal toxæmia. The constant diarrhœa, loss of sleep, loss of blood, continuous pain, and irregularities of digestion inevitably result in marked anæmia and general debility. With this develops the characteristic cachexia of the malignant neoplasm when the tumors undergo carcinomatous transformation; and death is the ultimate result of the disease when radical operation is not practised.

Diagnosis.—The diagnosis of multiple adenoma depends upon the subjective symptoms, together with the local manifestations of the disease. There is no occasion for a patient with a protracted and inveterate diarrhœa to be treated for months and then suddenly told that he has a neoplasm in his rectum.

The modern treatment of diarrhœa, when it persists longer than a day or two, demands a local examination of the rectum and sigmoid flexure. Under such circumstances adenoids will be seen or felt and the diagnosis made. Where there are more than one or two in the rectum, associated with tenesmus and griping pains, diarrhœa and hæmorrhages, it may ordinarily be assumed that there are others higher up. By the use of the pneumatic sigmoidoscope these may be seen up to the extent of the sigmoid flexure.

Palpation of the colon will sometimes reveal a thickening, but it is impossible to determine by this means the height to which the growths extend. It is important to determine this fact, however, and in these cases one need not hesitate to advise immediate laparotomy for examination of the colon throughout its extent, so as to determine the limitations of the disease.

Whether or not the tumors have undergone malignant transformation can be told by the induration, which is apparent to the touch when the tumor is within reach, by the odor of the discharges, or by the granular, ulcerative condition seen through the proctoscope. The microscopic examination of a section of a tumor is the most reliable evidence of such degeneration. Unfortunately the fact that one or two of these tumors does not show any malignant transformation, proves nothing with regard to the others. It has been shown by Hauser and Quénu

and Landel that a perfectly benign adenoma may be almost contiguous with one which has undergone marked epitheliomatous transformation. A positive negative opinion, therefore, with regard to malignancy can never be given in these cases. The chances are that in about 3 out of 4 cases of multiple adenoma malignancy occurs in some of the growths sooner or later.

In an examination with the finger one may feel a variety of growths ranging from a small pea-like protuberance to a well-developed tumor. The fact that the growths have or have not pedicles can not materially influence the diagnosis. In their earlier stages they are comparatively soft, but, being inflamed, or having undergone malignant transformation, they become hard, so that the sense of touch, so far as these characteristics are concerned, is not reliable.

Where the tumors are large, or the cancerous degeneration has gone on to such an extent as to cause a contracture of the caliber of the gut, one will find stricture or rectal occlusion.

Whitehead (*op. cit.*) lays stress upon the thickened, sausage-like feel of the sigmoid flexure in these conditions. The author has not been able to observe this in multiple adenomata, but has seen it a number of times in true carcinoma of the sigmoid unassociated with them.

Rotter has employed exploratory laparotomy as a means of diagnosis; and Sklifasowski and Lilienthal have made artificial ani in order to determine the upper limits of the growths. From Lilienthal's case it seems that where such a course is followed, the artificial anus should be made in the right inguinal region instead of the left, inasmuch as the growths, if they extend beyond the sigmoid flexure, are likely to go well into the ascending and transverse colon.

Pathology.—The tumors are seated, as a rule, upon the summit of the mucous folds, rarely growing from the grooves between them.

Macroscopic Appearances.—These have been described in the section on conformation. Quénu and Landel state that they sometimes appear as deformed, hypertrophied mucous folds.

Where they have undergone myxomatous changes they appear elastic and gelatinous to the touch.

The color varies from a dark purplish-red to a yellowish-gray, but these characteristics can not be observed in post-mortem pathological specimens.

Microscopic Examination.—Microscopic examination shows these growths to be composed of hypertrophied glands and connective tissue covered with cylindrical epithelium.

Microscopic Examination by L. Heitzmann.—"The tumor (Fig. 243) is composed of a myxomatous connective tissue containing a large number of lymph corpuscles and newly formed glands of varying sizes. These glands are partly of the tubular

and partly of the acinous variety, lined by cuboidal and columnar epithelia, arranged mostly in a single layer, though in some places stratified. The blood-vessels are found in small numbers only."

In some of the specimens examined the glands were very much elongated, and their lumen greatly enlarged. Sometimes they were transformed into actual cystic cavities.

Quénu and Hartmann state that the connective tissue is of the loose, fibrillary variety, infiltrated with lymphatic cells. It contains smooth muscular fibers, and is rich in blood-vessels which extend to the periphery of the polypus. This seeming disagreement with regard to the vascular supply of these growths is dependent upon the actual tumor examined. Some of them have a large number of blood-vessels, while others are very scantily supplied. In Lilienthal's case (Fig. 242) the polyps are said to have been composed of hypertrophied solitary follicles, but this appears to be unique.

Malignant Transformation.—

The benign epithelial tumors of the rectum derive an immense importance from their great tendency to transformation into cylindrical carcinoma. In two of the cases observed by the writer this change had already occurred at the time of the examination. In the other the tumors were removed from the rectum, and three months later the patient returned with a marked adeno-car-

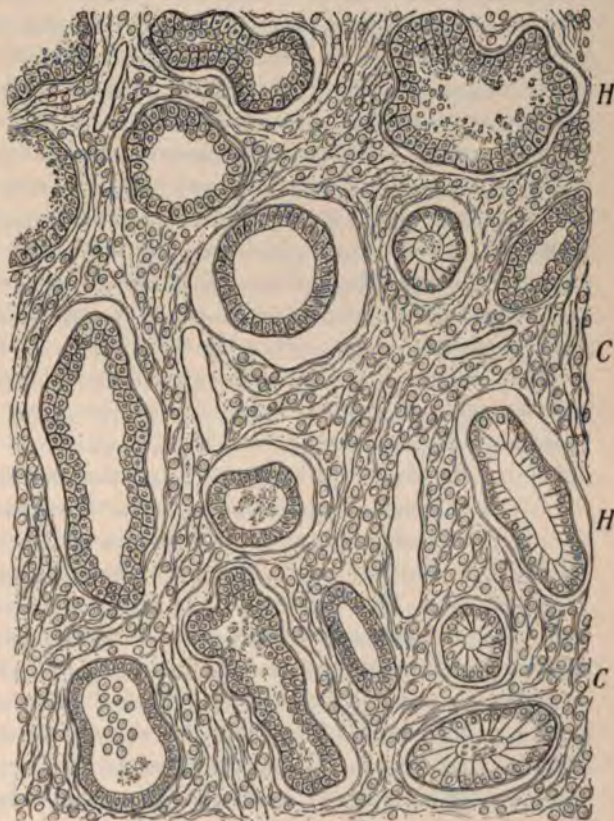


FIG. 243.—LYMPHO-ADENOMA. (Magnified 200 diameters.)

HH, hypertrophied, newly formed glands; CC, connective tissue containing numerous lymph corpuscles.

cinoma at the site of one of the largest growths. In the 42 cases collected by Quénu and Landel (*op. cit.*), 20 of them either had at the time, or developed afterward, true cylindrical carcinoma. While many of the growths contained typical adenomatous tissue, at the same time they presented an increase in the epithelial structures with the irregular disposition thereof characteristic of carcinoma. Hauser, Bardenheuer, Wulff, and Bickerstett have noted these changes in multiple adenomata scattered throughout the intestine and complicated by carcinomatous neoplasms. It is an established fact that a very large percentage of the cases of multiple adenoma, if left alone, will in time develop malignant transformation at some point or other. The fact that a microscopic section of a tumor of this type shows a benign structure is sometimes most deceptive, for one may very easily obtain the specimen from a benign growth, whereas the adjacent tumor has undergone malignant transformation. Even in the same growth one may find parts of it perfectly benign, while other parts have undergone epitheliomatous transformation. Wulff states that only the multiple variety of adenomata undergo this transformation. This agrees entirely with the writer's experience. There are no authenticated cases on record where a single pedunculated, adenoid polypus has recurred in the form of a carcinoma.

This predisposition to malignant change along with the diarrhœa, hæmorrhages, and exhausting mucous discharges makes this type of neoplasm one of the most serious with which we have to deal. The difficulty of entirely eradicating the growths when scattered throughout the course of the rectum, sigmoid, and colon renders anything short of the most radical and extensive operations worse than useless. The prognosis in all these cases is therefore exceedingly grave.

Treatment.—The treatment of multiple adenoma is very unsatisfactory. Diets of all kinds have been tried without any particularly good effect upon the diarrhœa and the discharges; in Lilienthal's case the meat diet seemed to have a very bad effect; in the author's cases chopped meat and meat broths, together with a small amount of starchy food, gave the patients more comfort than any other; the milk diet has not been satisfactory, as a rule; in some cases cereals with egg albumen reduce the number of stools.

Medicines are utterly unable to control the symptoms, with the exception of opium, which, if given in large enough doses, quiets the pain and controls the diarrhœal movements to a certain extent. Ergot and tincture of cinnamon, together with fluid extract of hydrastis, have a beneficial effect upon the hæmorrhages, but even this is only temporary.

Czerny (Quénu and Hartmann, vol. ii, p. 76) stated that the combination of opium and tannic acid, together with injections of salicyl-

ated oil, gave a temporary amelioration; the same is the case with other astringent irrigations.

Surgical procedures have proved but slightly more successful; only temporary benefits have been derived from the removal of the adenomata from the rectum. In a case seen with Dr. Ladinski, from time to time for over two years, the growths were snared off from the surface of the bowel, giving considerable relief to the diarrhœa, pain, and hæmorrhages; within two or three months, however, new ones developed, and other operations became necessary.

The operations which have been advised consist in the removal of the tumors from the intestine as high up as can be reached by ligature, cauterization, and radical resection. It is important before undertaking any of the procedures to determine if possible the existence of malignant degeneration. If such a condition exists, no operation short of radical removal of the affected area should be undertaken.

When the tumors are confined to the rectum and sigmoid, they may be removed through the cylindrical proctoscope and with a wire snare quite as effectually as by the more serious operations. Gerster in 2 cases did posterior proctotomy, laying the rectum open as high up as the fourth sacral vertebra, and leaving it thus open while from time to time he etherized the patient, and either snared or burned off the numerous tumors; he states in a private letter to the author that in both of these cases he succeeded in obtaining a cure by persistently repeating the operation, and believes this is the only means of doing so. Malignant transformation did not occur in either instance.

Guyon performed a like operation, removing 30 to 40 tumors by ligating the pedicles; his patient, however, died from vomiting and diarrhœa shortly afterward. Richet by the use of a rectal speculum removed between 80 and 100 polypi by seizing them with forceps and twisting their pedicles. Considerable hæmorrhage followed, which was checked by the injection of ice-water, and later by the application of the actual cautery to the stumps. A few months afterward the diarrhœa and hæmorrhage returned, and the patient was found to have developed other polypi in the field of operation. The difficulty of applying the cautery to the stumps through a speculum will be apparent to all. Whitehead, by applying his method of operation for hæmorrhoids, succeeded in removing along with the mucous membrane of the rectum a considerable number of adenomata. The relief, however, was only partial and temporary. Fochier (Lyon médicale, 1874) divided the mucous membrane of the rectum into five portions, dissected up the sections, and ligated them at the top, thus removing most of the growths. Within a year he had to intervene a number of times, adopting the methods which Kelsey, Smith, and Whitehead

have more recently advised, viz., curettage and cauterization of the tumors.

Thomas Smith (St. Bartholomew's Hospital Report, 1887) operated in this manner five times within the space of as many years to control the hæmorrhages in one of these cases; the patient finally died from peritonitis, having developed a cancer of the sigmoid flexure.

In Ladinski's case, operations by excision and cauterization had been tried before he began the method of snaring off the tumors. During the two years which he observed the patient, he removed at different sittings between 40 and 50 tumors from the rectum and sigmoid flexure. The patient is still alive and the tumors have not apparently undergone malignant transformation.

Lilienthal's case is perhaps the most remarkable of all those reported: A young woman twenty-one years of age had for years suffered from diarrhœa, hæmorrhages, and the passage of foul mucus; she finally became so weak and anæmic that left inguinal colostomy was done to give the pelvic colon and rectum rest. At this operation it was seen that the mucous membrane of the colon was covered with small polypoid growths extending above the inguinal anus. Notwithstanding this fact, she was much benefited, the hæmorrhages ceased, and the artificial anus was closed. It was only a short time, however, before all her old symptoms returned, and it became necessary to do something for her relief. On December 30, 1899, he performed a right inguinal colotomy, and found the colon at this height covered with large and small papilloma-like excrescences, which the pathologist, Dr. Mandlebaum, described as hypertrophied solitary follicles. The patient's hæmorrhages almost entirely ceased, although the visible mucous membrane seemed to be unchanged. The girl's impatience with the artificial anus and the fact that all her symptoms were almost sure to return if the same were closed, determined the surgeon to exclude the fæcal current from the entire colon. This operation he did on March 6, 1900, making an end-to-end union between the ileum and the lower portion of the sigmoid flexure. From this time on the patient's general condition was clearly improved, although she continued to have from 9 to 15 stools a day.

The artificial anus upon the right side was left open in order to give vent to the secretions of the diseased colon. The patient's insistence upon having the artificial opening closed, and willingness to assume all risks connected with the operation, led him to attempt the removal of the entire colon, which he did on June 15, 1900. After various complications of a most interesting nature, and associated with the most wonderful recuperative power, the patient recovered from this most remarkable and skilful operation.

The case was presented at the New York Academy of Medicine,

January 14, 1901, perfectly well, with the exception of a small sinus in the right iliac region, which, according to Lilienthal's report, entirely closed by April 16th. She was having then two movements a day; the stools were ordinarily semisolid, but sometimes well formed. The appearance (Fig. 242), the histological findings, and the results in this case are unique.

Kelsey states, after having operated nine times upon one patient by raclage and tearing away of the growths, that the only method which offers any prospect of a cure is a radical excision of the affected area.

Where the tumors are limited to the rectum or to any single portion of the colon, this may be accomplished, and even as in the case of Lilienthal, the whole organ may be removed, but it is a desperate resort. Where malignant transformation has taken place, this method certainly offers the only hope. It is useless, however, to attempt to remove one section of the gut, even if it contain a well-marked carcinoma, and leave a greater or less area above it affected by the adenomata. The diarrhœa, hæmorrhages, and discharge from these will almost surely prevent the union of the segments, and even if this should take place the recurrence of the epithelioma in them is almost inevitable. If the epitheliomatous change has taken place in the rectum or sigmoid flexure, an artificial anus may be made upon the left side and all of the gut below this portion removed after the method of Weir or Quénu. By such means the dangers of non-union between the two ends of the gut may be averted, and carcinomatous transformation in the parts above be indefinitely deferred.

As a palliative means, either an artificial anus upon the right side may be made, thus relieving the colon from the irritation of the fæcal passages, or, what is better still, the fæcal current may be diverted through anastomosis between the ileum and the rectum, as was done by Lilienthal, Rotter, and Holtmann. In the latter 2 cases the affected area was not removed, and both patients died—one from "cachexia" and the other from peritonitis. Quénu and Hartmann were more successful in a like case in which they made an anastomosis between the ileum and the last loop of the sigmoid flexure. This patient was greatly improved in health at the time of the report. The operation, however, does not aim at a cure, and can only result in an amelioration of the patient's symptoms. In Lilienthal's case the tumors showed no atrophy or decrease after the fæcal current had been diverted; it may obviate the carcinomatous transformation by the prevention of irritation from the fæcal passages. When such an operation is undertaken, the anastomosis should be made in the lower loop of the sigmoid flexure after the rectum has been practically cleared of the adenomata. When the disease is limited to the rectum, Gerster's method appears to offer the

best chance for cure; otherwise excision or entero-anastomosis should be done.

Villous Tumor: Papilloma.—Under the title “villous tumor,” Quain and Allingham have described a neoplasm consisting of a “lobulated, spongy mass with long, villous-like groups studding its surface.” The same growths have been described by different authors under different names: Glandular Papillomas (Gosselin), Villous Cancer (Rokitansky), Papilloma (Virchow), and Papillary Tumors (Forster). They are said to resemble very much the tumors of the same name found in the bladder, although the ends of the villi are generally more blunt or club-shaped (Plate V, Fig. 2). They arise from the superficial surface of the mucous membrane of the intestine, and are attached by a broad base rather than by a pedicle; they may occasionally become pedunculated, the broad, flat attachment to the mucous membrane being dragged out to the extent of 2 or 3 inches. Allingham states that this pedicle is apparent rather than real; that the tumors grow from the surface of the gut, and by their weight drag the folds of the bowel down and give rise to the appearance of a pedicle. They ordinarily grow well up within the bowel, and more frequently from the posterior wall, but they have been seen both on the anterior and lateral walls of the gut. When they arise from that portion of the intestine covered by peritonæum and become elongated or dragged down, it is possible for them to drag along with them a fold of this membrane, thus forming a sort of *cul-de-sac* in the wall of the gut (Allingham, *op. cit.*, 1896, p. 465). This fact appears to be inconsistent with the view taken by this author with regard to the origin of the growth upon the superficial surface of the mucous membrane; if the submucosa and muscular wall of the intestine are not involved in the growth, it is difficult to understand how it can drag down a fold or *cul-de-sac* of the peritonæum. The precaution, however, which he suggests with regard to the possibility of opening the peritoneal pouch by cutting off one of these tumors is well worth remembering.

These tumors are exceedingly rare; Allingham has collected in all 30 cases, 17 being in his own practice; Quénu and Landel have added 7 cases to this number, 4 of which they have observed personally, and have described minutely (*Revue de gynéc. et de chirur. abdom.*, February, 1899) under the name of villous tumors or superficial vegetating epitheliomas of the rectum. It is to these authors that we are indebted for a pathological study of these neoplasms.

They make a very clear distinction between these vegetating, superficial growths and those cases of secondary vegetations which develop at a late period upon the surface of true cancers. The cut (Fig. 244) is an excellent illustration of the appearance of these growths, and gives

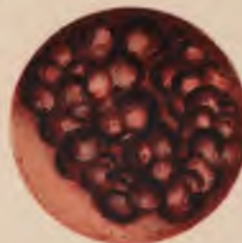
PLATE V.



CONDYLOMATA LATA



FIBROID POLYPUS



PAPILLOMA

CONDYLOMA, FIBROID, AND PAPILLOMA



a clear idea of the distinction between them and the cylindrical epithelioma as it first develops in the rectum. In one case they observed a villous tumor complicated by tuberculous ulcerations below, a colloid cancer above, together with a recto-vaginal fistula, and in which an ablation of the rectum was made and a cure resulted.

The macroscopic appearance, as described by these authors, differs very little from that given by Allingham and Quain. The tumors are red in appearance, soft and velvety to the touch, and vary in size from that of a pea to a small egg, although they are not ordinarily spherical but plaque-like; they are



FIG. 244.—VILLOUS TUMOR (above) AND CYLINDRICAL EPITHELIOMA (below). (Quénu and Hartmann.)

composed of large numbers of villi or papillæ, free at their surfaces but conjoined at the base, thus forming a sort of lobulated tumor.

The French authors state that in each lobe the papillæ group themselves anew in order to constitute lobules of a second or third order; that if the tumor be plunged into water the different lobules and papillæ float, and their divisions and subdivisions are easily perceptible.

These tumors may become very large; Allingham states that one of those which he observed was as large as a foetal head, and Cripps has reported one as large as his fist. Ordinarily, however, they do not exceed that of an English walnut. Hauser, quoted by Quénu and Hartmann, states that these neoplasms are seated exclusively in the mucous membrane or in the superficial layers of the submucosa; that they are formed of a greater or less number of excrescences, red, and of a medullary consistence. The French authors, however, state that they have never found the tumor to go deeper than the muscularis mucosa. While Hauser states that the tumors are ordinarily pedunculated, the French writers and Allingham claim that they are more frequently sessile, and that the villousities which constitute the tumor are directly implanted upon the wall of the intestine and united at their base. They say:

"The soft consistence of these tumors, their superficial relation to the intestinal mucosa, and their peculiar papillary structure constitute, from



FIG. 245.—SCHEMATIC ILLUSTRATION OF
RECTAL PAPILLOMA.

a macroscopic point of view, the fundamental characters which permit us to distinguish them from all other tumors."

The schematic cut, taken from Quénu and Hartmann (Fig. 245), represents the pedunculated form of these growths. The pedicle is composed of connective tissue, small vessels, smooth muscular fibers, together with some migratory cells and young connective-tissue cells. It is surrounded by a superficial fold consisting of interstitial tissue enclosing tubes of glandular appearance; the surface of the tumor is

covered with cylindrical epithelium; the interstitial portion is composed of fibrous tissue of new growth, constituting a sort of reticulum, and containing a large number of migratory cells and young connective-tissue cells, together with numerous small vessels (Fig. 246). According to Heitzmann, the structure of these growths is as follows:

"The tumor consists of a delicate connective-tissue stroma rich in blood-vessels and infiltrated with partly round and partly spindle-shaped lymph or inflammatory corpuscles. The surface is markedly papillary in nature, and the epithelial covering consists of either a single layer of columnar or comparatively thin layer of stratified cuboidal cells."

Quénu and Landel state that in the connective tissue there are included a large number of epithelial tubes extending to the extremities of the papilliform prolongations. These tubes are more or less ramified and irregular, and one recognizes in them some small cystic cavities lined with epithelium.

The alterations of the epithelium, according to them, present characteristics resembling both the adenoma and the cylindrical epithelioma. They note a gradual change of the epithelium in going from the base toward the periphery of the lobules, from an adenomatous type to a cylindrical epitheliomatous type, and also a predominance in a well-established tumor of the epitheliomatous type of these cells. This change in type consists in a gradual decrease in the mucous cupules and an increase in the granulation of the protoplasm, together with other more obscure changes, such as an increase in the reaction to coloring agents, in richness of chromatine, etc.

Their conclusions, after these extensive studies, is expressed in the following summary: "The villous tumors are, from a histological point of view, cylindrical epitheliomas presenting a remarkable tendency to maintain in a greater or less degree the primitive characters of the elements from which they are derived. This tendency manifests itself in the interstitial tissue, of which the primitive structure is not sensibly modified, and in the epithelial tissue which embraces a mixture of the epitheliomatous and glandular elements, more or less normal, with numerous forms in transition between these two types."

Etiology and Development.—The etiology of these growths is not understood. So far as age is concerned, it appears to be one of adult and advanced life. In 16 cases, 13 were found in patients above the age of forty years. In 3 cases it was found below the age of thirty years.

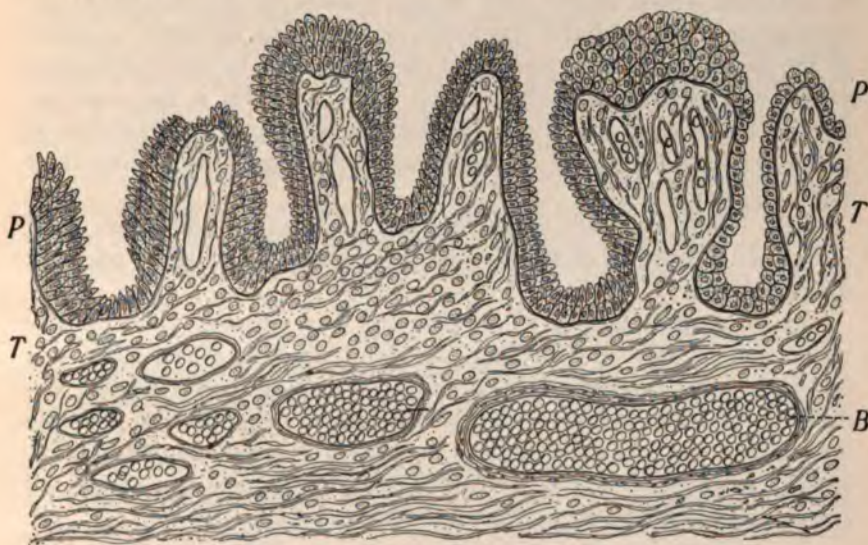


FIG. 246.—PAPILLOMA OF RECTUM. (Magnified 200 diameters.)

PP, papillae covered by columnar and partly cuboidal epithelia; *TT*, connective tissue infiltrated with lymph and inflammatory corpuscles; *B*, blood-vessels.

There seems to be no predominance in either sex; 8 have been observed in men and 8 in women (Quénu and Hartmann, *op. cit.*, p. 107).

As to the previous conditions causing the development of these tumors, little can be said. Constipation is the only habitual condition. The loss of blood and the existence of hæmorrhoids has been stated by Allingham to have existed in a number of patients, but no connection can be traced between these and the production of the growths. Some cases, even though the tumors have been discovered late in life, give the history of having had a loss of blood for many years, and the patients,

supposing they suffered from ordinary internal hæmorrhoids, gave the matter little concern. Inasmuch as the hæmorrhoidal development was not marked in any of these instances, it seems fair to presume that the blood came from the tumors which had existed for much longer periods than was supposed. No germs or bacteria have been discovered in the growths, although upon the surface and in the lacunæ numerous leucocytes have been found, together with colon bacilli and the various bacteria of the intestinal canal.

Symptoms.—The first and most prominent symptom connected with this type of the growth is the frequent and abundant discharge of a peculiar gluey mucus resembling the white of an egg, but staining the linen faintly yellow.

While there is a condition of costiveness, there is a frequent desire to defecate, which results only in the passage of mucous discharge. Allingham states that this discharge is simply an excessive secretion of the normal mucous membrane of the rectum due to the proliferation of the villi and mucus-producing cells. He considers it the most important symptom of the disease. The mucus escapes involuntarily at times, and it is impossible in many cases for the patients to keep their clothing clean.

This loss of mucus is weakening and debilitating, and shows itself in the pallor and loss of flesh in the patient, just as excessive purulent discharges do.

Hæmorrhages from these growths are very variable. Occasionally they come on only once in long periods of time, in others there is a constant oozing, and the mucous discharge is tinged with blood. Ordinarily the blood is fresh, and may continue to drip and ooze for some time after stool. At other times it is clotted, or black and decomposed. Large hæmorrhages may occur from these growths, exsanguinating the patient, and bringing on extreme anæmia or syncope.

In one case described by Cripps (*op. cit.*, p. 301), the patient only noticed that she had a free, watery discharge from the bowel, together with a sensation of the bowel's not being completely relieved. Careful examination, however, proved this discharge to be a very thin mucus, which rapidly decreased when the patient was kept in the recumbent posture. The discharge came from a large villous polyp attached about $3\frac{1}{2}$ inches from the anus.

Constipation has been mentioned as a typical symptom or prodrome of the condition. In the cases reported there seems to be no fixed rule concerning this, many of them suffering from constipation and others from diarrhœa. In the case referred to the author by Dr. Teague, of North Carolina, diarrhœa, tenesmus, and recurrent hæmorrhages were the important symptoms, together with a cachexia indicating ma-

lignant disease. This case is apparently well four years after the removal of the tumors. Two other cases, in which constipation was marked, died from carcinoma after the papillomata were removed.

Quénu and Allingham state that the descent or protrusion of the tumor when the bowels move, or even at other times, is one of the prominent symptoms; but in examining the reported cases, it is found that this does not take place in anything like the majority of them. The growths develop usually at a considerable height from the anus, the pedicles are not long, and therefore protrusion must be an exception rather than the rule. The authors quoted state when this occurs it is difficult to replace, and that it is during such a protrusion that the exaggerated hæmorrhages occur. In one case reported by Allingham, a hæmorrhage producing a syncope occurred under these conditions, but immediately ceased when the tumor was reduced.

Pain is not at all a prominent symptom. The patient's chief complaint is concerning the hæmorrhage and mucous discharges, together with a feeling of incomplete action of the bowels, a fulness of the pelvis, and weight or aching in the sacral region.

The constitutional symptoms are dependent upon these discharges and hæmorrhages, together with the irregular action of the bowels; they consist in a loss of flesh and appetite, digestive derangements, pallor, anæmia, and sometimes actual syncope after the hæmorrhages or diarrhœal attacks.

Mechanical interference with the passages may result in fæcal impaction, inducing tenesmus, flatulence, swelling of the abdomen, and all the symptoms due to obstruction, but such accidents are exceedingly rare.

To the touch the tumors present a soft, slimy, velvet-like feel, slightly elastic, and particularly wanting in that solidity which characterizes adenoma. The end of the finger can be insinuated between the lobules, and a villous-like feel can be made out.

If the tumor has been dragged down and its attachment to the wall of the gut can be reached, a broad, flat fold may be made out. The surface of this pedicle differs from that of the tumor itself in that it is soft, smooth, and has none of the villous-like characteristics of the tumor.

A point to which Quénu and Landel call particular attention in regard to these pedicles is that, even at the point of their insertion into the rectal wall, there is absolutely no induration, and the mucous membrane preserves its suppleness and normal constituency. It is this one point which distinguishes these growths clinically from cylindrical epithelioma, and gives them any right to be classed among the benign neoplasms of the rectum.

Through the speculum they appear as bright or dark-red mamillated masses, granular in appearance, and composed of lobules separated by deep sulci. In some cases their surface appears as a sort of shaggy efflorescence, resembling more or less closely the villous polypi of the bladder, but ordinarily the branches have club-shaped extremities (Fig. 247).

Diagnosis.—Papilloma or villous tumor may be confounded with mucous polypi, myxomata or fibromata of the rectum. The distinction between them and mucous polypi lies chiefly in the fact that the latter are found almost entirely in children, while papillomata are nearly always seen in elderly people; the pedicles of the former are much smaller

than those of the latter, while the discharge of mucus and blood from papillomata is much greater than that from the polypi. The consistence of papilloma is much less marked than that of fibroma, while its pedunculation is also less marked. Papillomata and multiple adenomata, while they both occur in elderly people, may be distinguished by the fact that the adenomata are firmer to the touch, and much more numerous as a rule. The surface of the papilloma



FIG. 247.—VILLOUS POLYP OF THE RECTUM (Ball).

is more irregular and lobulated; and, while there is a persistent gluey mucous discharge in these cases, there is never that uncontrollable diarrhoea, with muco-purulent dejections, such as is seen in multiple adenomata.

The distinction between these tumors and the vegetating form of carcinoma lies in the fact that there is no induration at the point of their implantation in the mucous membrane, and they are much less friable than the carcinoma.

Macroscopically and microscopically they resemble very closely the adeno-carcinomas of the rectum. Allingham has reported their recurrence after removal in the shape of carcinoma, and Quénu and Landel claim to have observed the transformation of one of these tumors into a malignant neoplasm without any surgical interference having taken place.

The following histological report of a case which gave every clinical appearance of being benign papilloma is corroborative of the theory of Hartmann and Quénu, that these growths are transformed into malignant neoplasms, and nothing short of complete removal and microscopical examination of the entire field can eliminate the possibility of such a change in any given case.

The macroscopic appearance of this growth is well delineated in Plate VII. Through the speculum the tumors gave every appearance of being benign. The constriction and induration of the gut above the base of the tumors, however, led to a clinical diagnosis of papilloma and carcinoma adjacent to each other. Microscopic examination, however, showed that the supposed papilloma had undergone malignant transformation.

Histological Report by Louis Heitzmann.—"The pedunculated growths in the lower portion of the tumor were found to consist in many places of connective tissue, partly fibrous, partly myxomatous in character, filled to a varying degree with lymph and inflammatory corpuscles, generally quite abundant and coarsely granular. Besides these groups, individual, large, irregular, coarsely granular multinuclear epithelia are found.

"The blood-vessels are quite abundant. In a number of sections, a few large, irregular, convoluted glands are present, the original layers of polyhedral nucleated formations filling the calibers to a greater or less degree.

"The diagnosis of these growths is adenoid cancer, changing to medullary, in all probability originally benign.

"Specimens from above these tumors show connective tissue greatly infiltrated with medullary corpuscles, while in the upper portions there are numerous irregular, coarsely granular, multinuclear epithelia of various sizes arranged in nests and tracts as well as irregularly scattered, and a large number of inflammatory corpuscles crowded with micro-organisms. The connective tissue here is generally scanty.

"The diagnosis of this portion of the tumor is medullary cancer in a state of ulceration and of a very malignant type."

This tumor was seen three months previous to operation, and there were no clinical evidences of malignant transformation at that time.

Treatment.—These tumors, while exceedingly rare, demand when once diagnosed a radical and prompt removal. The possibility of their transformation into malignant neoplasms, the certainty of their gradual increase in size, and the debilitating effect of the mucous and hæmorrhagic discharges from them, together with their mechanical obstruction to the normal action of the bowels, and the reflex irritations which they produce, render such a course mandatory.

The fact that the tumors may sometimes be spontaneously torn from their attachments and cast off (Allingham) should never be relied upon, or even mentioned, to excite an illusory hope in the mind of the patient.

Radical surgical interference is the only rational means of dealing

with such growths. Any compromising or palliative treatment, such as cauterizing with chemical cauterants, or even the actual cautery, will only result in temporary benefit and eventual injury to the patient. Recognizing the fact, as stated by Allingham and corroborated by Cripps and Quénu and Landel, that these tumors may drag down into their pedicles or bases little pouches of the peritonæum, one should be very careful in their removal that a method is employed which will absolutely prevent the opening of such a *cul-de-sac*.

Where the pedicle is of moderate size it may be encircled by a strong ligature and thus tied; the constriction of the ligature closing the peritoneal sac, if such should exist, will cause adhesion between its walls, and thus prevent an opening being made after the tumor is cut off. This method of applying the ligature, however, is somewhat dangerous, owing to the fact that it may slip off in a short time after it is applied, and thus allow the peritoneal cavity to open, or permit serious hæmorrhage. In order to avoid this, Quénu and Hartmann have advised that the pedicle be transfixed and then tied upon either side. This is a wise precaution, and would be perfectly acceptable were it not for the fact that the needle passing through the mucous membrane must also pass through the peritoneal sac and thus may carry infection into that cavity. Moreover, the threads passing through the pedicle and through the sac, if such be included in the pedicle, act as a sort of wick for the first few hours; and if there be septic material in the rectum will carry it into the peritoneal cavity, and may thus set up a peritonitis.

It seems better, therefore, where the tumor is of small size to tie the pedicle tightly by the ligature and leave the tumor *in situ* until it sloughs away; by this procedure there is little danger of the ligature slipping off.

Where the pedicle is broad and large, and the tumor is obstructing the lumen of the gut, this method is not altogether satisfactory. It is important in such cases that the tumor be removed at once. One should therefore take every antiseptic precaution and apply the transfixion method, taking the chances of infection as mentioned above. Instead of passing the ligature through the center of the pedicle, it may be passed through the mucous membrane at each border, and tied as a mattress suture. One might also apply hysterectomy forceps to the stump in such cases, leaving them on for two or three days.

Where the tumor has no pedicle, and its base is as large as its extremity, it should be excised, and the edges of the wound sutured together with catgut sutures.

In the case described by Cripps (*op. cit.*, p. 303) the pedicle was very broad. He transfixed and tied it at several points in order to perfectly control the hæmorrhage, taking the chances of infecting the

peritoneal pouch by the needle and the wick-like action of the ligature. As these growths are not multiple, resection of the gut is rarely if ever called for until transformation is observed.

Cystoma.—This general term, indicating cystic neoplasms, embraces, so far as the rectum is concerned, all those tumors which have undergone cystic degeneration, as well as dermoids and hydatids.

Reference has been made to the cystic degeneration of adenomas, fibromas, and other neoplasms of the rectum; in all of these cases the cyst is of secondary consideration, the true histological nature of the tumor being preserved more or less in the walls of the cyst and the solid portions of the growth.

Simple Cysts.—These growths are very rare in the rectum. Prideaux (London Lancet, August 18, 1883) has recorded a very interesting case. A woman who had suffered from a very difficult labor complained of intense pain in the pelvic region; her abdomen became distended and tympanitic, and she exhibited all the signs of intestinal obstruction; she described herself as unable to pass gas on account of something closing up the rectum.

Digital examination of this organ elicited a tumor almost as large as a foetal head resting low down in the ampulla of the rectum. It was soft and elastic, and gave the impression of an intussuscepted intestine. "The tumor was not covered by mucous membrane, its surface being rough and much injected."

It was dragged down and out of the anus, and was found to be attached by a pedicle 6 inches in length, which was tied in two places and cut off. The tumor itself contained half a pint of albuminous fluid, and its walls measured from $\frac{1}{8}$ to $\frac{1}{4}$ of an inch in thickness. No pathological examination was made to determine the histological nature of the growth. The external covering having been described as different from mucous membrane, one would have expected to find evidences of a dermoid cyst, but from the description one can only conclude that it was a simple cyst in which the characteristic elements of the mucous membrane had been destroyed by pressure or distention. Cripps describes two other cases of a similar nature. The benign nature and extreme rarity of this type of tumor render a prolonged discussion superfluous.

Dermoid Cyst.—Here one must clearly distinguish between true dermoids of the rectum and those which develop in its walls, the rectovaginal septum or the retro-rectal space. Such tumors are not at all infrequent in these regions, but true dermoids of the rectum are extremely rare.

Those which originate outside of the rectum may break through into it by ulceration or rupture, and thus protrude in a polypoid-like manner into the gut, giving the impression of a growth originating within

the organ. Such a case has been related by Jardine (*Glasgow Med.*, 1893, p. 50): A little girl aged ten years suffered from a discharge of blood and pus with her stools, and during defecation there protruded from her anus a mass of tufted hair matted together. A careful examination of this child's rectum showed a rent in the wall with ulcerated edges, through which the discharge came and the tumor protruded. It was clearly a case of a dermoid cyst originating outside of the rectal wall that was forced through by straining and abdominal pressure.

Port (*Transactions of the Path. Soc. of London*, 1880, p. 307) relates the case of a girl aged sixteen, from whom he removed a tumor apparently originating in the rectum. It was composed of skin covered with hair and sebaceous follicles; its central mass was chiefly composed of fat and fibrous tissue, and within the central cavity there was found a well-developed tooth growing near the pedicle. There were also embedded in this tumor two masses of bony substance, one hard and the other of a spongy consistence. While the patient is said to have experienced the protrusion of a tuft of hair frequently when at stool, no account is given of such a tuft being found upon the surface of the tumor after it was removed.

Bazel (*Langenbeck's Archiv*, Bd. xvii, S. 442) related the case of a woman who suffered from a protrusion of hair from the anus when at stool. He removed from her rectum a tumor the size of an orange, which was attached by a pedicle to the posterior wall of the rectum about $2\frac{1}{2}$ inches above the anus. Upon an examination of the tumor it was found to be composed of a sort of dermoid covering from which were seen growing long tufts of hair, and at one place a small tooth. Inside there was a distinct development of brain substance surrounded by a sort of bony capsule, together with fibrous and fatty cells.

Barker (*Med. Press and Circ.*, 1873, p. 208) described a tumor of the rectum composed of bone, sebaceous matter, and small hairs. This was in all probability a dermoid cyst, but the description is so imperfect that one can not tell whether it originated within the rectal wall or outside of it.

Clutton (*Transactions of the Path. Soc. of London*, 1886, p. 552) has reported a case of a girl nine years of age, who suffered extremely with constipation, tenesmus, and the presentation of a tumor at the anus whenever the bowels moved. She also complained at times of fever and loss of blood. An examination of the abdomen showed a distinct tenderness over the sigmoid flexure, and also the existence of a tumor in that region. After a short time the sphincters were dilated, and the tumor was seen to come down well into the rectum within reach. An examination elicited the fact that this tumor was attached by a double pedicle which originated about the juncture of the rectum and sigmoid

flexure. A ligature was placed upon each of the pedicles as high up as the fingers could reach, and the tumor was removed. An examination of the growth showed it to be a typical dermoid cyst, covered with true skin tissue and hairs, and containing all the elements usually found in these growths.

Gant has also reported a case of this kind. No explanation has yet been offered of the method of development of these tumors within the rectum. While those posterior to the rectum have been said to originate in the remnants of the neurenteric canal, it seems impossible for those developing in the upper regions of the rectum to have so originated.

Golding-Bird (*Lancet*, 1894, vol. ii, p. 1482) removed a tumor from the walls of the rectum by incising the mucous membrane over the growth and ligating the pedicle. An examination of the tumor showed it to be cystic, filled with a clay-like fluid, and containing all the structural elements found in the wall of the large intestine. The author considered it without doubt a dermoid cyst originating in the walls of the rectum. Hunt (Med. Repository, 1821, p. 79) relates the case of a little girl, twelve years of age, who had become weak, anæmic, and her abdomen swollen and tympanitic. One day she felt something give way in the left side, and immediately thereafter she passed a considerable quantity of bloody water by the rectum. This was followed in a few days by a discharge of pus, blood, and mucus. Some four weeks later a spherical tumor presented itself at the anus, partially protruding. As its presence caused the patient much pain and an uncontrollable desire to defecate, an immediate removal became necessary. A ligature was placed as high up as possible, and the greater part of the tumor was cut away. The rest of it eventually sloughed off, and the child made a good recovery. The growth was covered with hair and a sort of dermal tissue, and in its center there were found two teeth, together with fibrous and fatty tissue.

Van Duyse (*Bull. of Anat. Royal of Belgium*, Brussels, 1896, p. 583) has reported a case of a woman thirty-two years of age who passed spontaneously from her rectum during labor a tumor which, on examination, proved to be a dermoid cyst partially encephaloid, and containing a rudimentary eye. The patient developed no unusual symptoms, and made a perfect recovery. No examination was made with regard to the source of the tumor, or whether it originated in the rectum or within the recto-vaginal septum. The description given leads one to believe that it originated in the wall of the gut or entirely outside of the rectum proper.

In the summer of 1899, Prof. A. R. Robinson showed the writer a tumor the size of a foetal head which had been passed from the rec-

tum of a patient during labor. The tumor had evidently been torn from its capsule or attachment within the pelvis, had broken through the rectal wall, and had been forced out through the anus in advance of the child's head. Its pedicle was tied and cut off by the midwife. It proved to be a dermoid cyst. He was unable to induce this woman to enter the hospital and have proper treatment, notwithstanding there was a rupture in the wall of the gut large enough to introduce several fingers through it; she entered another hospital, was treated for puerperal peritonitis, and recovered.

From these experiences one must admit that, while true dermoid cysts within the rectum are exceedingly rare, one not infrequently finds tumors of this type in the walls of the gut or attached to their outer surface. These walls may be ruptured by various processes, especially during labor, and the tumor be brought down within the gut or delivered through the anus.

The etiological factor in them all is similar to that of dermoid cysts elsewhere in the body. They are nearly always found in the female sex. It is perfectly clear that they are congenital from the number of cases found in young children. That they are not discovered until later in life is due to the fact that some patients are not susceptible to reflex irritability, or the tumor remains of small size and occasions no inconvenience until it offers an obstruction to the fœtal head or to a large, hard stool.

Extra-rectal Dermoids.—Dermoid cysts may occur just outside of and attached to the rectal wall either in the perinæum or in the retro-rectal space. Calbet (Thesis, Paris, 1893) stated that these tumors were comparatively frequent. The writer has removed from the retro-rectal space a tumor about the size of a pigeon's egg which bulged out into the rectum and led him to believe that it was in the rectal wall. It was removed through the rectum by dilating the sphincter and then making a longitudinal incision through the wall of the gut. The tumor was found to be situated in the cellular substance posterior to the rectum, and attached to the rectal wall, but not in it. It contained a lock of hair, some sebaceous material, and a mass of partially developed bone.

In another operation upon a similar tumor situated just beneath the peritonæum in the recto-vaginal septum, the woman had complained very much of irritation and pain when fœcal passages were hard, and had a distinct hypertrophic proctitis, which was the cause of an aggravated pruritus. An examination of the rectum showed this little tumor about the size of a small olive situated $2\frac{1}{2}$ inches above the margin of the anus. There was also an adhesion of the uterus to the rectum, and obstruction to the fœcal passages had been noticed for a long time. The vaginal *cul-de-sac* was opened, the adhesions were broken through,

the uterus was lifted up with gauze packing, the peritonæum was stripped upward, and the little tumor, which had a distinct pedicle, was enucleated and the pedicle twisted off. It was composed of a dense, fibrous capsule enclosing a soft, yellowish, semifluid substance, together with three pieces of bone and a partially developed eye-tooth.

Manuel (Senn on Tumors) refers to 2 cases of dermoid cysts which were situated between the peritonæum and the levator ani muscle.

König reported the case of a suppurating cyst found enclosed in this same locality. Ord (Med. Chir. Transactions, vol. xlii, p. 1) found in the pelvis of a man twenty-eight years of age a dermoid cyst weighing 14½ pounds; but he does not state whether this was within the peritoneal cavity or extra-peritoneal.

Page (Brit. Med. Jour., 1890, vol. i, p. 406) removed a dermoid cyst weighing 3 pounds from the hollow of the sacrum in a woman thirty-eight years of age. These cysts may also develop outside of the anus, as in the case of Duret related by Fourné (Jour. des scs. méd. de Lille, 1893, p. 346). The patient in this case was thirty years of age, and had carried this cyst at the margin of the anus supposedly from birth. The tumor was of a dark-red color, which extended down even into the pedicle by which it was attached. Its surface was richly vascular, and covered with a thin, smooth skin continuous with the skin of the anus. The tumor was removed by incising the skin around the pedicle, dragging down upon the latter and cutting it off, the edges of the skin being sutured together. Duret was under the impression that this tumor was a melicerous cyst. Microscopic examination showed that it was one of the rare types of dermoids.

Treatment.—These tumors should be removed either by ligature or dissection under the most rigid antisepsis. Cauterization, curettage, and local treatment are worse than useless in such cases.

Postanal Dimples.—Along with dermoid cysts one may consider “postanal dimples” which, according to histologists, are due to similar imperfections in the development of the embryo. They occur chiefly in the region of the sacrum, coccyx, and posterior margin of the anus, and are said to be caused by imperfect union between the two lateral halves of the foetal body.

They occur as slight, fissure-like (Fig. 247*a*), or cylindrical depressions (Fig. 247*b*) in the skin, varying in depth from several inches to a mere depression upon the surface. They are lined with true epithelium, and contain sebaceous glands and hair follicles.

A distinction should be made between these and the sinuses which occur in the sacro-coccygeal region as a result of obstructed sebaceous follicles. In the latter hairs frequently accumulate, being broken off from the surface of the body, and working their way inward through

friction of the clothing; but these can be easily drawn out, and do not show any roots. In congenital dimples the hairs grow down within the sinus, and when pulled out not only give pain, but have distinct roots at the end.

These little dimples from irritation, lack of cleanliness, or other causes may become closed at the surface and present the appearance of small cysts. When pressure is exerted upon them under such circumstances, sebaceous material and epithelial debris may be squeezed out,



FIG. 247a.—CONGENITAL POSTANAL FISSURE.



FIG. 247b.—CONGENITAL POSTANAL DIMPLE.

(Markoe and Schley, *Am. Jour. Med. Sc.*, May, 1902.)

and sometimes even pus appears, produced by inflammation and infection, giving the impression that one has to deal with an external blind fistula.

Occasionally where suppuration takes place it may burrow downward, coming close to the anus or even entering the rectum. W. Travis Gibb related a case of this kind in which the fistula extended from the middle of the posterior surface of the coccyx downward and forward, ending near the rectum between the external and internal sphincters. A lock of hair extended almost through the tract. When this was pulled out the fistula appeared to be of the ordinary external blind variety, with the exception that the external end was infolded and lined with the normal skin. It was laid open, curetted, and healed, leaving a small depression in the skin.

Treatment.—If a dimple is deep and irritating, it may be well to dissect it out and suture the edges of the wound together. If, however, it is simply a depression and not irritating, it is better to leave it alone, and impress upon the patient the necessity of keeping the parts clean without any undue irritation. Squeezing and digging at them is harmful, and should be avoided.

Occasionally pulling the hairs out and cauterizing the tract with

nitrate of silver will result in their obliteration, but if a small piece of adhesive plaster is worn over the opening, the dimple will be kept clean and rarely give any inconvenience.

Sacro-coccygeal Tumors.—Certain sacral and sacro-coccygeal growths develop upon the anterior surface of the sacrum or coccyx, and may be mistaken for tumors of the rectum, or may originate outside of these bones and extend inward, and thus seem to be connected with the gut.

In discussing them it may be well to refer to Sutton's theory of embryological formation of tumors in this region. He says: "In the early embryo the central canal, spinal cord, and alimentary canal are continuous around the caudal extremity of the notochord. The passage which unites them is known as the neurenteric canal. When the proctodæum invaginates to form a part of the cloacal chamber it meets the gut at a point some distance anterior to the spot where the neurenteric canal opens into it. Hence there is for the time a segment of the intestine extending behind the anus, and termed, in consequence, the postanal gut. Afterward this section disappears, leaving merely a trace of its existence in a small structure at the tip of the coccyx, known as the coccygeal gland or gland of Luschka."

The embryonic tissue thus left is a fertile source of tumors of the congenital cystic variety. In this region, therefore, we may meet several different forms: dermoid cysts or foetal inclusions; tumors of the coccygeal gland arising from the remains of the postanal gut; and tumors of the neurenteric canal.

Calbet, Braune, Molk, and Taneffi have made special studies of these cases, and their results are extremely interesting. Calbet reports 111 cases and Molk 115.

The most common point of origin is upon the anterior surface of the coccyx and sacrum. The next most common point is upon the posterior surface of the sacrum. The neoplasms found here are various, consisting of mixed tumors, lipomata, sarcomata in different forms, carcinomata, dermoid cysts, fibroids, and simple cysts. The most common type of the tumors seems to be a sarcomatous degeneration of the fibrous tissue. They are largely found in children, and are nearly all congenital. Many in which the growths have been found were still-born, and others died soon after birth. In Calbet's statistics 60 per cent died before the end of the second year.

In 83 observations by this author the tumors were composed of foetal tissue; there were 50 deaths and 23 cures or ameliorations. As results of operative treatment, Molk collected 31 cases with 14 recoveries, and Calbet 53 cases with 37 recoveries, a total of 84, with 33 deaths, or a mortality of 39.3 per cent. From these statistics one can not but conclude that the prognosis of such tumors is very grave, and much

more so because one includes among these those distressing cases of spina bifida occurring in the anterior wall of the sacrum, and producing what appears to be a tumor of the rectum.

While sarcoma is the ordinary form of malignant tumors found in this location, it is not the only one. Fletcher and Waring (Transactions of the Path. Soc. of London, 1900) relate the case of a child aged two years who was operated on for the removal of a tumor in the coccygeal region, which had been present from birth. It was removed by a perineal incision. The coccyx was excised, owing to its attachment to or involvement in the tumor, and the patient made a very good recovery. An examination of the growth showed it to consist of two parts: one a dense, hard, semisolid substance and the other soft and compressible. The soft part proved to be an adeno-carcinoma, while in the dense part there were numerous tubules of various sizes lined with columnar epithelium, with a considerable quantity of vascular, connective tissue. Two and a half months later this patient returned to the hospital, and died shortly afterward. The autopsy revealed the fact that the pelvis was filled with recurrent masses of adeno-carcinoma. The writers assume that the origin of this tumor was in the postanal gut. They also report the case of a child who died on the seventh day after an operation for an adeno-cystoma originating in the neurenteric canal.

Spina bifida may also occur in this region, not only alone, but as a complication of other tumors; this is a fact which is not ordinarily appreciated. The writer came very near mistaking such a tumor for an ordinary cyst some years ago, and was only deterred by the wisdom and kind advice of L. Emmett Holt, who had seen the case before, and warned him to carefully exclude anterior spina bifida before undertaking the operation. A very careful study of the case demonstrated that Dr. Holt was right in his diagnosis. The proposed operation would almost surely have proved fatal.

Treatment.—The fact that most of these tumors are malignant in character renders the prognosis very unfavorable. Excision offers the only hope of cure, but it should never be undertaken without a perfect knowledge on the part of the patient, or the parents, of the probable outcome. The operation should be done under the strictest aseptic precautions entirely outside of the rectum, even if the coccyx and a part of the sacrum have to be removed to accomplish it. In anterior spina bifida, either simple or complicated, the prognosis is so grave that it is doubtful whether any operative interference is justifiable.

Angeioma.—This type of tumor, consisting of dilated venous capillaries bound together with connective-tissue bands, occasionally occurs in the rectum, forming a sort of nævoid mass. It is derived from the submucosa, and is ordinarily congenital. Barker (Med. and Chir. Trans-

actions, 1883-'84, p. 229) records the case of a man forty-five years of age who died of anæmia, the result of severe rectal hæmorrhages. Microscopic examination after death showed that the tumor from which the bleeding occurred was an unmistakable angioma or nævus.

Another case of this kind is reported by Marsh (Med. and Surg. Soc., 1883). A little girl ten years of age had suffered with rectal hæmorrhages for eight years; an examination with the speculum showed a nævus entirely surrounding the rectum and ascending $1\frac{1}{2}$ inch above the anus. In this case the neoplasm was treated by the use of Dupuytren's cautery, which gave relief but did not cure the condition. Martin, of Cleveland, has also seen a case of this type in an adult.

In all of these cases the history of the disturbances dates back many years, and it is presumable that they were congenital.

Treatment.—The rarity of these cases renders it impossible to speak from experience with regard to their treatment. It seems reasonable to suppose, however, that the Whitehead operation would effectually remove these growths if low down in the rectum; if high up, electrolysis would probably be the safest procedure.

Verruca.—These growths, known also as warts, vegetations, condylomata and papillomata, are found frequently around the margin of the anus, especially in stout individuals. So frequently are they associated with genito-urinary affections that they are frequently called venereal warts. Aside from the type known as condylomata lata, which is a variety of mucous patch, the growths are in no wise venereal in the strict sense of the word. They consist of a simple hypertrophy of the papillary layer of the skin. This hypertrophy may be caused by any chafing or irritating discharge. It depends essentially upon moisture, and therefore the condition is never observed in people who are strictly attentive to personal cleanliness.

The growths sometimes develop upon the summits of mixed hæmorrhoids, but here they attain only a small size. Around the margin of the anus they may grow to enormous proportions, entirely surrounding this organ and extending forward over the perinæum, upon the vulva or scrotum, and upward into the inguinal region (Plate V, Fig. 1).

Careful research has failed to determine any specific bacillus or parasite to account for them. They begin as small wart-like excrescences, and develop rapidly in proportion to the amount and irritating qualities of the discharges which bathe them.

The color varies from pale white to that of bright red, and sometimes the condition much resembles a vegetating epithelioma. The distinguishing feature between these conditions is the absence of any induration in the deeper tissues at the bases of the vegetations. Some are covered with a firm epithelial layer, and may be handled with im-

punity so far as pain and bleeding are concerned. In others, wiping or cleansing them will result in quite considerable and obstinate bleeding.

The growths are not painful, as a rule, but when they involve the muco-cutaneous margin they may result in such dragging upon the mucous membrane as to produce anal fissure, and this becomes a source of great pain.

Treatment.—The treatment of these growths may be operative or non-operative. Certainly the most radical and quick method of eradication consists in clipping them off at their bases with scissors, and using hot compresses to control the bleeding. This method is always effectual, and is without any particular danger if thorough antiseptic irrigation is employed during the operation. It requires general anæsthesia, however, in extensive growths.

The non-operative treatment consists in checking the discharges from whatever sources they may come, in keeping the parts absolutely dry by the application of such powders as oxide of zinc, calamine, starch, tannic acid, calomel, etc. The tumors may be cauterized from time to time with chromic or nitric acid, or better still with monochloroacetic acid. The chief point, however, in the treatment consists in keeping the parts absolutely dry, and this is essential after operation by excision, as the vegetations will undoubtedly recur unless the parts are protected from the irritating discharges which originally caused them.

Fungus of the Rectum.—Under the name of “fungus recti” a number of distinctly different conditions have been described; some of them are merely inflammatory excrescences, some true papillomata, and others syphilitic vegetations.

Mollière has described under this class of cases a form which he denominates “benign fungus of the rectum.” It is in reality only a mass of granulation tissue due to constant irritation. He observed it always in children suffering from prolapse or inflammation of the rectum. The fungus was nothing more or less than an hypertrophy of the villi or granulation tissue over the ulcerated areas. Around the anus, however, a true fungoid growth may be met with. This consists in the ray fungus, technically called actinomyces. The condition is extremely rare. Doloire (Lyon médical, 1898, July 10) gives a clear description of this condition, and states that it is the only case reported in French literature: A man fifty-six years of age had suffered twenty years previously from an ischio-rectal abscess which healed rapidly. Marked induration was observed in the ischio-rectal fossa, and masses of fungoid growth surrounded the anus, through which ran many fistulous tracts. The rectum was not affected, nor was the bladder or urethra, the condition being perirectal and periurethral. A flaky, yellowish-white discharge exuded

from the mass, and on examination it was found to contain the spores of actinomycosis. The presence of these peculiar-looking, yellowish-white granules, resembling somewhat the crystals of iodoform and consisting of a center of fine granular matter, generally calcareous, grouped about which were numerous club-shaped bodies composed of a limiting membrane with a clear, homogeneous, refractile protoplasm, were considered pathognomonic evidences of the ray fungus. It is spoken of by dermatologists as the cause of pruritus ani, but it is certainly a very rare cause of this condition, as we are unable to find a single case of it recorded in the records of St. Mark's Hospital, and none has appeared at our clinic.

Hydatids.—This variety of tumors does not occur within the rectum, but a number of cases have been reported in which the tumors occurred in Douglas's *cul-de-sac*, in the mesorectum, and in the recto-vaginal *sæptum*, and could be felt through the rectal wall. In some instances this wall has been so thinned by the pressure of the tumors that they have ruptured through into the gut.

About 4 per cent of these tumors occur in the pelvis. According to Jensen, Madelung, Freund, and Villard, they are found in women, as a rule. An interesting case of this type has been recently reported by Bangs (*Annals of Surgery*, May, 1900); the tumors seemed to involve the bladder and prostate, but were afterward found to be in the rectovesical pouch and crowding the pelvic organs; they were removed by an operation through the abdomen, and the patient made a successful recovery.

Diagnosis.—The diagnosis of these tumors is extremely difficult. There is nothing characteristic in their feel, shape, or symptoms to distinguish them from other tumors found in the same location. Ordinarily the diagnosis is only made after or during an operation for their removal. The hydatid thrill is said by some to be of assistance in distinguishing them, but when the tumor is situated in the pelvis it is impossible to make this out. Practically the diagnosis can only be made by the microscopic examination of the fluid. If the tumor is within reach this may be obtained through an aspirating needle, under strict antiseptic precautions, the presence of a single hydatid hooklet being pathognomonic evidence of the nature of the growth. Should the cyst rupture into the rectum the hooklet may be found in the fecal dejecta.

While the seat of these tumors is usually in the peritoneal cavity, between the rectum and the uterus, or the rectum and bladder in males, this is not always the case. Meyer, quoted by Piecheldt (*Commentatio de Tumoribus in Pelvi*, Heidelberg, 1840), performed a laparotomy for a tumor of the pelvis which he supposed to be a steatoma, but it proved to be a mass of hydatids between the rectum and the upper vaginal wall.

Unfortunately his patient died forty hours later from peritonitis. Blot (*Compte rend. de la soc. de biol.*, 1859) and Roux (*Jour. de méd. de Sédillot*, 1828) both relate cases in which the hydatids were found in the recto-vaginal septum.

Obre (*Transactions of the Path. Soc.*, 1854) reported a very interesting case in which rectal obstruction was due to hydatid cysts in the mesorectum. Madelung has collected 66 cases of pelvic hydatids, 5 of which were between the vagina and the rectum, and 7 in the connective tissue about the rectum. Although these cases are rare, they are sufficiently well authenticated to put us upon our guard when diagnosing tumors of the pelvis involving the rectum. They are quite important, because they are more dangerous than almost any other form of cyst in this region.

Treatment.—The results of operations have not been very satisfactory. The majority of writers believe, where the diagnosis is once made and the tumor does not seem to cause much annoyance or to give great pain, that they had better be left alone. If it should be necessary to interfere with them, however, a radical and complete removal of the cyst is the only safe method. If possible they should be removed unbroken.

The injection treatment, whether by iodine, carbolic acid, or Morton's fluid, and tapping, are not only ineffectual, but may cause actual harm by allowing the fluid of the tumor to escape into the cellular tissues or into the peritonæum, which accident is nearly always followed by a rapid fatality.

Hypertrophied Anal Papillæ.—In connection with the benign neoplasms of the rectum we may call attention to certain hypertrophies of the papillæ about the margin of the anus. They can scarcely be termed neoplasms, being only excessive growths of normal tissues. They consist in marked hypertrophy of the anal papillæ normally found upon the borders of the semilunar valves; it may take place in one or more of them, and they may attain considerable size and length (Fig. 248). While these growths are said to be highly endowed with sensitive nerve-ends, they rarely produce any pain. They occasion, however, a great deal of uneasiness in the rectum, spasm and hypertrophy of the sphincter, and consequently constipation, associated sometimes with neuralgia of the rectum. They appear like little white fibrous teats or warts; they can be seen through the speculum, and sometimes by dragging down on the buttocks. They are also appreciable to the touch.

A marked symptom of this condition is the feeling of incompleteness in the faecal movements; the patient is never perfectly relieved by the same until, through pressure and gradual retraction, the papillæ resume their normal position and the desire for further stool then passes away.

The amount of disturbance and annoyance occasioned by these little teats can hardly be appreciated by those who have not observed them. Occasionally they grow to such an extent that they are mistaken for polypi of the rectum or connective-tissue hæmorrhoids.

The treatment of this condition consists in the absolute removal of the papillæ. This may be done by scissors or crushing with the hæmorrhoidal clamp. As the bleeding is very slight there is no necessity for



FIG. 248.—HYPERTROPHIED ANAL PAPILLÆ.

ligature or cautery. If there is much hypertrophy of the sphincter, this should be done under general anæsthesia, and a large Pennington tube should be retained in the anus for several days in order to obtain complete relaxation of the muscle; otherwise the papillæ may be removed by the use of cocaine or eucaine, and the patient need not be confined to bed. While there is little to be said with regard to the pathology and treatment of this condition, it is one of the most fertile sources of rectal neurosis.

CHAPTER XIX

MALIGNANT NEOPLASMS—CARCINOMA AND SARCOMA

IN our general divisions of neoplasms of the rectum they were classified as connective-tissue, epithelial, muscular, and irregular growths. Those in which the cellular elements are normally arranged and fully developed have been described as benign neoplasms, and those in which these elements are irregularly arranged, growing outside of their normal sites and imperfectly developed, as malignant. Carcinoma of the epithelial and sarcoma of the connective-tissue type practically comprise all the malignant tumors of the rectum. That doubtful variety of epithelial growths, *villous tumor*, might properly be classed with the former on account of its extreme tendency to carcinomatous transformation, if indeed it has not always some epitheliomatous foci in it; but its exact status is not definitely settled, and it has seemed wise to follow in the tracks of the large majority of writers who consider it benign.

CARCINOMA

Vital statistics show an alarming increase in the prevalence of carcinoma throughout the civilized world. Williams (*Liverpool Chirurg. Jour.*, 1895, p. 56) has shown that the disease has increased in England and Wales from 1 in 5,646 in population in 1840 to 1 in 403 in 1894. The proportion of deaths from cancer to those from all other causes in 1840 was 1 to 129, and in 1894 it had increased to 1 in 23. In the city of New York, in 1890, the death-rate from cancer was 1 to 1,679 in population; in 1900 it had increased to 1 in 1,394 (statistics compiled for the author by Dr. Roger S. Tracy). Parke (*The Practitioner*, 1899, p. 378), in discussing this rapid increase in malignant disease in the State of New York, says: "If for the next ten years the relative death-rates are maintained, we shall find that ten years from now—viz., 1909—there will be more deaths in New York State from cancer than from consumption, smallpox, and typhoid fever combined." This alarming prophecy has practically come true in the adjoining State, New Jersey, the authorities of which have recently announced that deaths from cancer during the year 1900 were more than those from either tuberculosis or typhoid fever. Newsholme (*The Practitioner*,

1899, p. 370) attempts to prove that this increase is more apparent than real. He practically admits, however, that modern methods of examination and improved diagnostic means will account for only a very small proportion of the increase. It is an incontestable fact that the disease is becoming more and more prevalent, and bears each year a larger and larger proportion to the general mortality.

Two other facts which are equally as discouraging appear to be clearly proved by the statistics upon this subject. First, the increase is most noticeable in the civilized and prosperous districts; and, second, the death-rate in proportion to the cases observed has shown no material reduction. Modern science has developed no immunizing or preventive means to check the onward march of this most fatal malady. State and national health boards have devised all sorts of quarantine and other methods for the control of typhoid fever, tuberculosis, and other contagious diseases, but no practical steps have been taken with regard to cancer, if we except the State of New York, in which there has been recently established a fund for the study and development of methods for its cure.

Seat of the Disease.—Carcinoma may develop in any tissue or organ of the body where epithelial cells are found. Certain locations, such as the mammæ, the uterus, and the skin, are particularly prone to be attacked. The older statistics of Williams (*The Lancet*, London, 1884, vol. i, p. 934), Jessett (*Cancer of the Alimentary Tract*, London, 1886, p. 238), and Leichtenstern (*Cyclopædia of the Practice of Medicine*, 1877, vol. vii, p. 635) show that 3 per cent of all cancers occur in the rectum, and that 80 per cent of all those found in the intestine are located in this organ. More recent statistics, however, show a somewhat higher percentage of the neoplasms in the rectum. Zemann (*Bibliothek d. medicin. Wissenschaften*, Bd. iii, H. 1 and 2, S. 49) found in 21,624 autopsies at the Vienna General Hospital 1,744 cancers. Of these, 912 involved the digestive tract, 9 of which were in the small, and 156 in the large, intestine. Of the latter, 30 were in the sigmoid flexure and 81 in the rectum. Heimann found in 20,054 patients who died of cancer in the general hospitals of Prussia that 10,537, or over 50 per cent, involved the gastro-intestinal tract. Of these, 2,910 were in the intestine, 1,204 being confined to the rectum. Combining the figures of Heimann, Zemann, Kronlein (*Deutsch. Zeitsch. f. Chir.*, 1900, S. 53), and De Bovis (*Revue de chirur.*, Paris, 1900, tome i, p. 679), we find that in a total of 45,906 cancers, 2,177, or 4.8 per cent, occurred in the rectum. If we add to these the cases occurring in the sigmoid flexure, the percentage is raised to 6.2 per cent. From these figures one must conclude that cancers of the rectum and sigmoid form a somewhat larger percentage of the total than is generally admitted.

The site in these organs at which the disease occurs most frequently is somewhat difficult to determine. For the purpose of studying this feature the organs may be divided into four portions—the *anal*, the *infraperitoneal*, the *supraperitoneal*, and the *sigmoidal*. The anal portion includes all that part of the rectum below the internal sphincter; the infraperitoneal portion extends from the internal sphincter to the tip of the coccyx, and is about 2 inches in extent; the supraperitoneal portion extends from the tip of the coccyx to the recto-sigmoidal juncture opposite the third sacral vertebra; and the sigmoidal portion from this point to the lower end of the descending colon.

In a collection of 1,029 cases of cancer in these organs, the disease was located in the anus and rectum 901 times, and in the sigmoid flexure 128 times. Of those in the anus and rectum, the seat of the disease has been quite definitely stated in 602 cases. The anus was chiefly involved in 6.7 per cent, the infraperitoneal portion in 26.3 per cent, and the supraperitoneal portion in 67 per cent. In many cases, however, two or more portions of the gut were involved in the same growth. The following table, compiled from 32 personal observations (27 carcinomas and 5 sarcomas) shows the proportionate frequency with which different portions of the organs are chiefly affected:

	Number of cases.	Percentage.
Anal portion.....	3	9.4 per cent.
Infraperitoneal portion.....	6	18.7 "
Supraperitoneal portion.....	18	56.2 "
Sigmoidal portion.....	5	15.6 "

In all but 7 cases the recto-sigmoidal juncture was involved to a greater or less degree in the disease.

These figures are practically in accord with those of Quénu and Hartmann (*op. cit.*, vol. ii, p. 120), who insist upon the frequency with which carcinoma involves the supraperitoneal portion of the rectum. This fact is of great importance, for it demonstrates that a very large proportion of cancers of the rectum can not be extirpated without opening the peritoneal cavity, and that, while many involve the lower portion of the organ, very few of them are confined to it.

The types of neoplasms found in these various sites may be stated in a general way as follows: The squamous or pavement epithelioma is found in the anal portion; adeno-carcinoma and medullary cancer are found in the infraperitoneal and in the lower portion of the supraperitoneal areas; medullary and scirrhus carcinomas are chiefly found in the supraperitoneal portion and in the sigmoid flexure. These rules are not absolute, however, as we may occasionally find cylindrical epithelioma or medullary cancer in the anus, and, as Quénu and Hartmann state,

squamous epithelioma may be found high up in the rectum following prolonged chronic proctitis.

Etiology.—The cause of cancer is one of the most mooted questions in all surgical pathology. After centuries of discussion it is yet unsolved. Age, heredity, occupation, climate, locality, diet, mechanical and chemical irritants, animal and vegetable parasites, have all been accused of producing the disease, and yet pathologists have not been able to settle upon any of them as the exciting factor. Certain of them seem to have a predisposing influence, but no one can positively be shown to produce the disease.

Recent statistics seem to show substantial ground for belief in the parasitic origin of the disease, and yet many of the most careful and logical observers hold that the observations upon which this theory is based are open to so much criticism that nothing has yet been proved.

Heredity.—The influence of heredity in the production of cancer is firmly grounded in the popular mind. The fact that the disease occurs in the same family more or less frequently lends color to this belief. In comparison with the number of cases observed, the instances of hereditary taint are very few; especially is this true if the comparison is confined to the direct relationship between parent and child. Very often the evidence of heredity is based upon the fact that some distant relative, such as an aunt or a cousin, third or fourth removed, has at some time in the past suffered from this disease. The fact that the malady is one of middle or later life would contraindicate the hereditary influence, for it seems impossible that an inherited taint should lie dormant for forty, fifty, or sixty years and then suddenly become active at a time when all the vital processes are in a state of decline.

In recent years a number of cancers have been seen in comparatively young people, and among these heredity seems to be somewhat more clearly established. In 5 cases observed by the author under twenty-five years of age, 4 of them gave a very clear history of direct heredity in the fact that one of the parents in 3 cases had died from cancer, and in the fourth a grandmother and brother had both died from the same disease. In the fifth case the patient lost his parents very early in life, and could therefore give no information as to the cause of their death or his own hereditary tendencies. Quénu and Hartmann have observed this same fact with regard to young people. Stierlin established heredity in 12.5 per cent of his own cases, and Heuck in 4.6 per cent. Recognizing the fact, however, that cancer is particularly prone to develop in certain regions, and that generation after generation of the same family are born and reared in these districts, it is more rational to assume that the cancer is due to some local influence connected with the soil or water than to heredity.

Age.—Age has always been considered a predisposing cause to cancer. Its maximum frequency is between forty and forty-five years in all statistics, but it is found at almost every age. The following table, compiled from three sources, exhibits this fact remarkably well:

	Finet's collection.	Quénu and Hartmann's personal cases.	Author's collection.
Under 20.....	..	..	7
From 20 to 25.....	} 25	3 }	6
From 25 to 30.....			7
From 30 to 35.....	18	0	25
From 35 to 40.....	38	3	26
From 40 to 45.....	35	5	25
From 45 to 50.....	51	8	27
From 50 to 55.....	47	8	29
From 55 to 60.....	55	4	30
From 60 to 65.....	27	} 5 }	24
From 65 to 70.....	20		6
From 70 to 80.....	5	4	2

The decreasing frequency of the disease after sixty years of age may be attributed to the comparatively small number of people living at this age.

With the increase of cancer, however, it is observed more and more in young people. In the vital statistics of New York city for the year 1900 there were reported 6 cancers in patients between five and ten years of age, 4 in those between ten and fifteen, 6 in those between fifteen and twenty, and 20 in those between twenty and twenty-five. The author has observed within the past two years 7 cases of carcinoma of the rectum and 3 of the sigmoid flexure in patients under thirty years of age. Schoening (*Deutsche Zeitschr. f. Chirur.*, 1885, Bd. xxii, and *Annals of Surgery*, 1885, vol. ii, p. 343) has collected 13 cases of cancer in individuals under twenty years of age. Allingham and Czerny have each reported cases in children of thirteen years. May has reported 1 in a child of twelve and Godin 1 in a child of fifteen.

In the cases observed in children, it has appeared to be not so much a question of age in years as age in tissues. Where there is a tendency to early retrograde processes in the animal economy, where the patient matures prematurely, carcinoma is likely to develop early in life. In all the cases in which the disease has been observed by the author below thirty years of age, there have been evidences of premature decay in the patient, such as gray hair, parched and wrinkled skin, loss of suppleness in the joints, and obstinate constipation with dry, hard stools. It is a question, therefore, whether the modern stress of life may not tend to an earlier retrograde movement in the tissues and consequent development of carcinoma. Certainly, the proportion of cancers occurring below the age of thirty-five years has greatly increased, and this seems to be the only rational explanation of it.

Sex.—While cancer in general is incontestably more frequent in women than in men, that in the rectum is undoubtedly more frequent in men. Kronlein, Brandt, Stierlin, and Quénu and Hartmann found that 66 per cent of cancers of the rectum occur in males. In Finet's statistics 63 per cent were found in males. Williams found the disease in 130 males and 129 females, but his experience is exceptional. In the cases collected by the author, 60 per cent were in males. This does not include cancers of the sigmoid flexure, of which 80 per cent were found in men. No satisfactory explanation is given of this fact. Those who believe in mechanical and chemical irritants as the exciting cause of carcinoma attribute the frequency of the disease in the generative organs of women to the frequent traumatism to which these parts are subjected. This same school claims that the preponderance of carcinoma of the intestines in men is due to coarser diet, more rigorous life, dissipation, and constant traumatism to which the intestines are subjected by straining at heavy labor and athletic exercises.

The influence of constipation and the resting of the fecal mass at certain portions of the intestinal canal would seem to have some influence in the production of the disease, inasmuch as those portions of the gut at which the mass is arrested are by far the most frequently affected. This theory, however, meets an offset in the fact that women are proverbially more constipated than men, and therefore we would expect to find cancers of the intestines more frequently in this sex, whereas the opposite is actually found.

The parasitic theory of disease offers a more acceptable explanation of these figures. Men travel very much more widely than women. They are subject to the influence of changing climate, soil, and waters, and are therefore more frequently exposed to whatever infectious or contagious elements these may possess. If this theory as to the etiology of cancer is proved, it will easily explain the preponderance of intestinal cancer in the male sex; at the same time it will cast just as much doubt upon the cause of its frequency in the generative organs of women. The fact that men suffer more frequently than women from cancer of the rectum is established, but why we do not know.

Occupation.—Vocation is frequently spoken of as a predisposing cause to cancer, chimney-sweeps being cited as marked illustrations of the fact. Experience and the studies of Newsholme (*The Practitioner*, 1899, p. 370) convince us that occupation has, if any, a very slight etiological influence in the disease.

Previous Diseases.—The influence of previous diseases of the intestinal canal in the production of carcinoma seems to be well established. Volkmann, Quénu and Hartmann, and Stierlin claim that 15 per cent of all carcinomas of the rectum are preceded by hæmorrhoids. These

figures, however, are not convincing, for it is an established fact that 15 per cent of the individuals suffering from any class of diseases known to human nature are affected with piles. Dysentery, colitis, and ulcerative diseases of the intestinal canal have been frequently known to precede the development of cancer. Prolonged irritation of the epithelial tissue in these organs, as in the lip or throat, will no doubt contribute to the development of the disease, and this may be induced by constipation of long standing or the lodgment of a foreign body at some portion of the canal. While it is stated farther on that constipation is one of the first symptoms of cancer, may it not be that cancer is the last symptom or result of constipation? Multiple polypi, adenoids, and villous tumors frequently precede the development of cancer, and in one instance the author has seen the neoplasm develop in a syphilitic rectum. Mucous or membranous colitis is frequently a precursor of rectal cancer, and thus derives a greater importance.

HISTOLOGICAL TYPES.—There are four elementary types of cancer found in the anus, rectum, and sigmoid, viz., epitheliomatous, adenoid, medullary, and scirrhus carcinomas. All of these are subject to colloid, myxomatous, mucous, cystic, and ulcerative changes which alter their clinical, macroscopic, and histological features to such an extent that the modified neoplasms are often described as distinct types. These subdivisions only serve to confuse the reader, and the author will confine his descriptions to the simple types enumerated above.

From the point of view of malignancy, cancers found in these parts may be mentioned in the following order: medullary, adenoid, epitheliomatous, and least of all scirrhus.

Carcinomas are all composed of two essential elements, the epithelial cells and the stroma, the latter forming series of alveoli in which the former rest. The different varieties are distinguished by the character of the cells and amount of stroma. The epithelial cells are of the embryonic type, and of every shape and form—squamous, cylindrical, oval, caudate, round, etc. They contain single or multiple nuclei, with prominent nucleoli. The character of the epithelium is usually that found in the tissue in which the carcinoma develops; the shape of the individual cell, however, is governed largely by the pressure to which it is exposed in the alveolus.

Cancer begins by the epithelial cells invading the lymphatic spaces, which they distend so as to form alveoli, but do not attach themselves to the fibrous walls. The stroma is composed of the fibrous or myxomatous tissue of these spaces containing more or less of the histological elements of the parts in which the growth is found. In the rectum it frequently contains tubules, follicles, and unstriped muscular fibers; it

reaches its highest development in slowly growing tumors, such as scirrhous, and its lowest in the fulminating variety of neoplasms, such as medullary cancer. The alveoli, which connect with each other, are the original lymph spaces of the tissue, and are therefore freely connected with the lymphatics of the parts. This fact accounts for the spread of the disease along the lymph channels. The blood-vessels and nerves ramify in the stroma, but they do not enter the alveoli, hence the disease seldom follows these tracts.

Epithelioma (Squamous Epithelioma, Skin Cancer).—The term epithelioma is often applied to all types of cancer. In this work, however, it will be limited to the squamous variety, which occurs chiefly at the muco-cutaneous margin of the anus. Histologically the growth is characterized by the presence of cuboidal or flat epithelial cells arranged in concentric layers. A transverse section of these masses exhibits the so-called epithelial pegs or nests (Fig. 249). When the central portion of the epithelia undergo fatty degeneration (Heitzmann) or hardening (Coplin), small, shining, irregular masses are produced known as the cancer pearls. These pearls are also seen in other pathological conditions, and are not therefore pathognomonic. The epithelial cells invade the lymph spaces from the surface. The stroma is comparatively slight, and is composed of connective tissue, partly fibrous and partly myxomatous, in the specimen shown. It con-

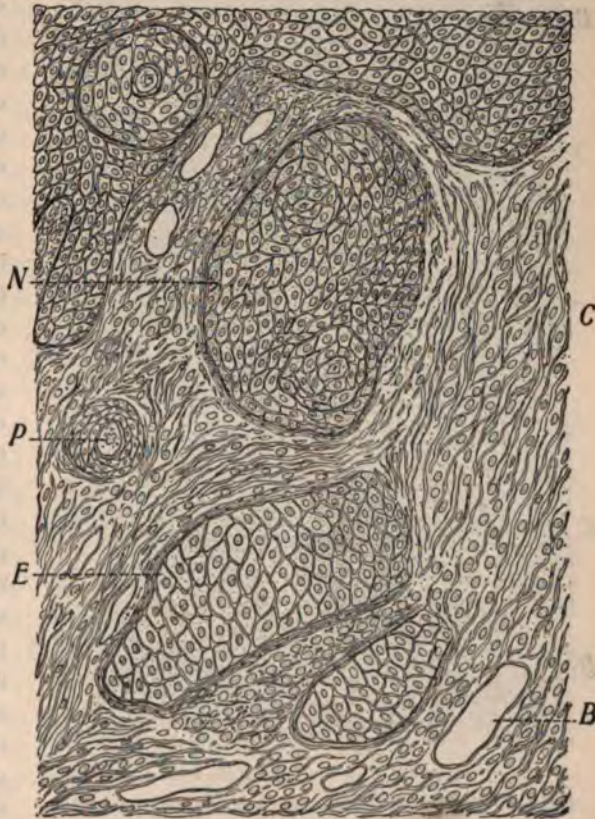


FIG. 249.—EPITHELIOMA. (Magnified 200 diameters.)

N, epithelial nest with concentric arrangement of epithelia; E, epithelial peg; P, cancer pearl; C, connective tissue with inflammatory corpuscles; B, blood-vessel.

tains a moderate number of blood-vessels, and is infiltrated with inflammatory corpuscles.

As clinically observed, epitheliomas are largely confined to the anal margin. They begin as slight nodular elevations in the skin or just beneath the epithelium, over which the skin is not movable. When fully developed they appear as irregular wart-like elevations with indurated bases. The ulcers may discharge a watery or ichorous fluid; they have a distinct tendency to scab over, and each time the scab drops off the ulcer

increases in circumference. Around the edges of the ulceration distinct nodules are observed. The course of the neoplasms is to surround the anus and extend into the skin of the perinæum and sacrum rather than up into the rectum. The tissues around the ulcers are always indurated, but, as Coplin says, "this induration does not limit the extent of the tumor." The growth and extension of these neoplasms is very slow. Squamous epitheliomas are sometimes very painful, at others not at all so; they occasionally bleed slightly from traumatism or abrasion, but rarely if ever occasion severe hæmorrhages; they are distinguished from rodent ulcers by the nodular, elevated base and excessive granulations



FIG. 250.—ADENOID CANCER. (Magnified 300 diameters.)

EE, convoluted epithelial tracts enclosing calibers of varying diameters; CC, connective tissue crowded with inflammatory corpuscles; BB, blood-vessels.

dent ulcers by the nodular, elevated base and (Plate VI, Fig. 2).

Adenoid Cancer (Cylindrical or Columnar Epithelioma; Malignant Adenoma).—This is the most frequent variety of cancer in the rectum proper. It consists of tubular cavities of irregular form arranged in

manifold convolutions, and lined by cylindrical or columnar epithelium. The tubules are separated by a fibrous or myxomatous stroma; the convolutions are arranged in groups; the epithelia are similar to those lining the Lieberkühn follicles arranged at right angles to the stroma and possess no basement membrane; they are short, nucleated, and in many places broken up into medullary corpuscles which partly or completely fill the caliber of the tubules (Fig. 250). The stroma is infiltrated with these corpuscles, and contains comparatively few blood-vessels. The more rapid the growth, the more atypical is the glandular formation and the smaller are the cells and lumina.

Clinically these growths appear as soft, sometimes gelatinous, elevated, lobular masses. Upon squeezing or section they exude a watery secretion—the so-called cancer juice—which, dropped into water, turns milky white. They may grow very rapidly and protrude into the rectum to such an extent as to obstruct its caliber; they are associated with abundant discharge of mucus, and often bleed very freely.

Early metastasis is the rule, especially in the liver, and the secondary nodules possess the characteristics of the primary growths. They are distinguished from simple adenoma by the irregular arrangement of the cylindrical cells and the absence of a basement membrane, but the fact that simple adenoma may undergo transformation into adenoid cancer, renders it very difficult to make a diagnosis between them. Certain tumors on the border-land between the two often exhibit the characteristics of benign adenoma in one portion and indubitable carcinoma

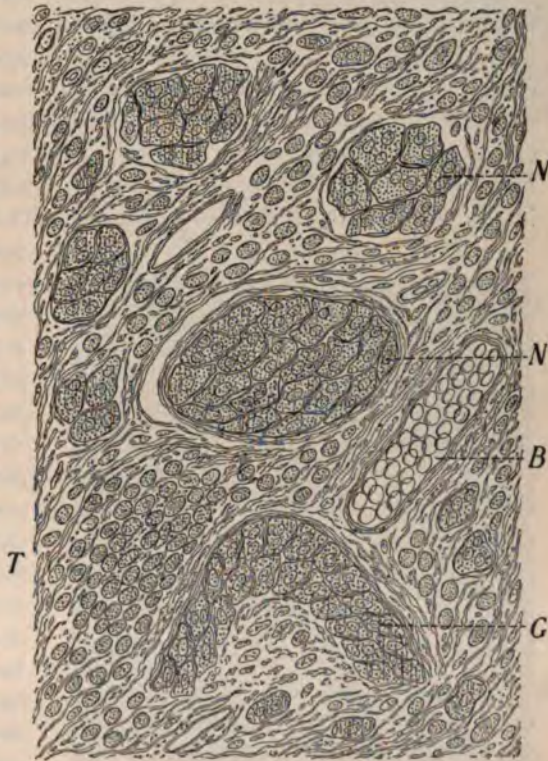


FIG. 251.—MEDULLARY CANCER. (Magnified 400 diameters.)

NN, nests of cancer epithelia; *G*, remnant of gland; *T*, connective tissue crowded with inflammatory corpuscles; *B*, blood-vessel.

in another. Small sections of such growths are therefore unreliable in the making of positive diagnoses. On this account it is always best to treat them as if they were well-developed carcinomas.

Medullary Cancer (Soft Cancer, Encephaloid Carcinoma).—This is the most malignant of all types of rectal carcinoma. It consists in a soft, pulp-like growth characterized by large and irregular epithelia, coarsely granular and multinucleated, with scanty stroma, fibrous in its character and densely infiltrated with inflammatory corpuscles. The epithelia are arranged in an irregular manner, sometimes in nests (Fig. 251); the alveoli are large; the stroma is often embryonic or myxomatous in character, and is abundantly supplied with blood-vessels. Clinically

the growth occurs in the rectum as a soft, nodular ulcerating mass, seated upon or surrounded by dense fibrous tissue. It bleeds easily upon touch, discharges abundant pus, grows rapidly, and soon involves the neighboring organs. It ordinarily occurs earlier in life than scirrhous, but it may result from degeneration of the latter. Glandular involvement is earlier than in any other form of cancer, although remote metastatic deposits are not so frequent as in adenoid cancer owing to the fact that it usually kills before these take place.

Scirrhous Cancer (Fibrous Carcinoma, Hard Cancer, Acinous Cancer).—This type of carcinoma is the least frequent and slowest growing of all cancers of the rectum. It is composed of dense fibrous

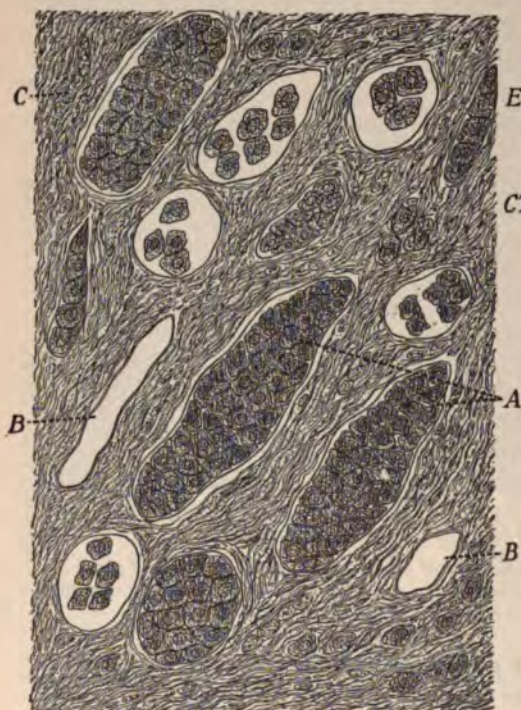


FIG. 252.—SCIRRHUS OF INTESTINE. (Magnified 350 diameters.)

CT, dense, fibrous connective tissue; A, alveoli filled with cancer epithelia; C, cluster of connective-tissue corpuscles; E, row of cancer epithelia; B, blood-vessels.

stroma and epithelial cells. The stroma is so arranged as to form a series of alveoli which contain the epithelial cells (Fig. 252). The alveoli are small, and the epithelial cells are atrophied, compressed, or degenerated.

There are few blood-vessels in the denser portions of the tissue, but more in the periphery, the walls of which are thickened and more or less fibrous. On being cut, the tumor presents to the naked eye the appearance of a bluish-white gristly mass, containing here and there patches of fatty tissue, which are more numerous near the center of the tumor. If the cut is made through the center of the growth, the central part of the cut surface will retract, causing a cup-like depression, constituting the so-called cancer cup.

Clinically these tumors appear in the shape of a gradually contracting stricture of the organ. They cause no pain, very little discharge, and no hæmorrhages from the rectum. Gradually increasing and intractable constipation is the salient feature. Cachexia and sepsis are practically absent, and unless the tumor is transformed into some other type, the final end occurs through intestinal obstruction or rupture of the gut above the growth.

Scirrhus is subject to hyaline, mucoid, colloid, and fatty degenerations. The chief change to which it is prone is transformation into medullary carcinoma. Melanosis has been observed, and calcareous infiltration of the tumor is not infrequently seen. Coplin has described a type of atrophic scirrhus in which the fibrous tissue predominates, and the epithelial cells are therefore pressed upon and often disappear from many areas of the growth. Under such circumstances the tumor grows smaller instead of larger. These growths, however, have not been observed in the rectum.

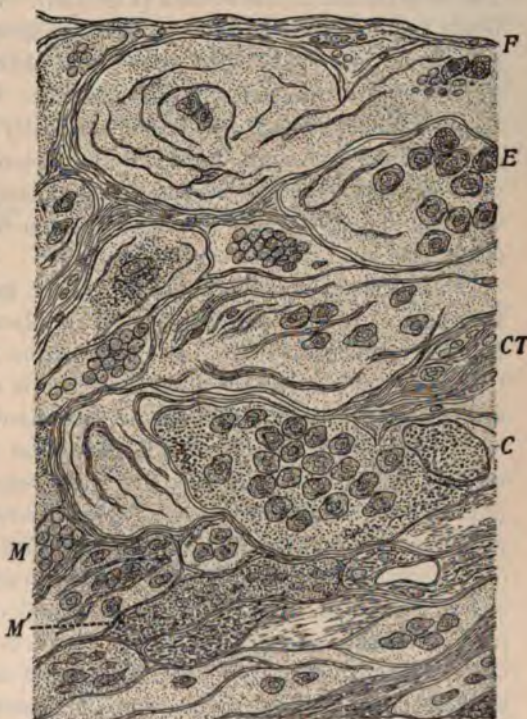


FIG. 253.—COLLOID CANCER OF LARGE INTESTINE.
(Magnified 350 diameters.)

F, connective-tissue framework; *E*, cancer epithelia partly filling alveolus; *C*, alveolus filled with colloid substance, a number of epithelia unchanged; *CT*, connective tissue with medullary corpuscles; *M*, medullary corpuscles; *M'*, medullary corpuscles changing to colloid substance.

Colloid carcinoma may develop from any of the four types which we have above described. It consists in a degenerative change in the epithelial cells and in the stroma (Fig. 253). When the substance that distends the alveoli is more viscid than gelatinous, it is called mucoid degeneration. It is said that the colloid change occurs in the cell itself, the mucoid in the intercellular substance. Chemically these two conditions may be distinguished, but clinically they can not. As Coplin says: "Until our methods of differentiation become more accurate and we know more of the evolution of mucoid and colloid carcinoma, it would probably be best to consider them both under the head of gelatinous or gelatiniform types of cancer."

Symptoms.—The symptoms of cancer in these organs depend upon the stage of the disease, the type of neoplasm, and its site in the canal. In all carcinomas which do not result from the transformation of other tumors or pathological conditions, there is a latent period in which no symptoms appear that can not be accounted for by other causes. The local and constitutional manifestations at this period do not in any wise indicate the serious nature of the disease. The existence of cancer is therefore compatible with a perfect state of health for considerable periods of time. Frequently patients with well-developed carcinomas of the rectum or sigmoid recall that for long periods they have noticed vague, indefinite discomforts in the regions of the sacrum or around the pelvis, with increasing constipation or a tendency to diarrhoea and some slight derangements of the digestion, none of which were severe enough to attract any particular attention. Gradual loss of strength, increased pain, or unusual bleeding from the rectum induces them to consult a surgeon. Ordinarily the disease is well developed before this, and it is absolutely impossible to state just when or how it began.

The fact that the first manifestations of carcinoma may be a vague discomfort in the pelvis, symptoms of intestinal or gastric indigestion, constipation, or a colicky tenesmus, with or without the passage of mucus and flecks of blood, emphasizes the importance of early local examinations in patients with such symptoms. It is not sufficient to introduce the finger 3 or 4 inches into the rectum and, if no neoplasm or pathological condition is observed, exonerate the rectum and the sigmoid from any part in the production of these symptoms. A more careful and extensive examination is necessary. By the pneumatic proctoscope and specimen forceps (Fig. 254) it is possible to bring into view and take sections from every portion of the sigmoid flexure and determine almost in the earliest stages of this disease its existence and its site. The author has by this means diagnosticated and afterward removed 5 carcinomas of the sigmoid flexure in which frequent digital examinations and abdominal palpation had failed to determine any path-

ological condition to account for the diarrhoea and constipation. In the early stage, where the carcinoma is within reach, it may appear as a small plaque-like deposit beneath the mucous membrane of the rectum, slightly movable upon the muscular wall, and decreasing the suppleness of the tissues. These deposits are chiefly found in the anterior and posterior segments of the circumference, although they are occasionally seen in the lateral segments. They involve only a small portion of the



FIG. 254.—RECTAL SPECIMEN FORCEPS.

circumference, and have a tendency to extend in all directions. Such deposits generally indicate the development of adenoid or medullary cancer.

In other cases the first appearance of the disease is in the shape of little papillary excrescences protruding into the rectal caliber, but connected with the mucous and submucous tissues by an indurated base. These tumors always result in adenoid cancer. They bleed easily from the beginning, and can be clearly seen through the sigmoidoscope. In the first or plaque-like form, ocular examination reveals only a slightly congested, thickened, and smoother condition of the mucous membrane over the deposit. In scirrhus one observes in an early examination a sort of annular deposit in the submucosa resembling very closely a simple fibrous stricture of the gut. It is almost impossible to diagnose carcinoma of this type in the latent stage. The symptoms are those of obstipation, gradually increasing, with or without bloody or mucous discharges. The history of the case may be of diagnostic importance, for inflammatory strictures are nearly always preceded by some traumatism, ulceration, and suppuration, whereas this type of carcinoma is not ordinarily preceded by such processes. While in this latent period the diagnosis of malignant disease is often quite uncertain, wide clinical experience and careful observation over certain periods of time will enable one to recognize the condition before it arrives at an incurable stage.

In the active or proliferative stage the symptoms are more marked. In scirrhus or annular carcinoma, which is chiefly met with in the upper rectum and sigmoid, gradually increasing constipation is the typical symptom. There may be colicky pains in the stomach or upper portions of the intestine, aching in the sacral region, and occasionally there is a sharp, cutting pain at the seat of the growth. As a rule, however, pain is not a prominent feature at this period or in this type of the disease.

A slight mucous discharge, occasionally tinged with flecks of blood, appears in this stage, and there may be an accumulation of gases in the intestine causing tympanites. As the growth increases and the caliber of the gut is more and more encroached upon, obstruction to the faecal passages becomes more marked, friction is more noticeable, and the amount of blood in the discharges becomes more abundant.

At this time a certain amount of procidentia or intussusception of the affected into the lower portion of the gut will occur. This practically produces a procidentia of the third degree, in which the neoplasm forms the lowest portion of the prolapse, and around it there exists a circular *cul-de-sac* or sulcus into which the finger or bougie will slip instead of into the caliber of the gut. Examination with the proctoscope under these circumstances exhibits a mass in the center of the intestinal caliber resembling very much the cervix uteri. The lumen of the gut at the strictured point usually appears as a lateral slit, and the mucous membrane may or may not be ulcerated according to the stage of the disease and the amount of traumatism to which it has been subjected by the passage of hard faecal material. When within reach such a growth imparts to the finger the sensation of a dense, inelastic, nodular mass, in the center of which there is a greater or less lumen. With the finger of one hand in the rectum and the other pressing down upon the abdomen, such growths may sometimes be brought within reach, whereas they can not be felt by the ordinary methods of digital examination.

The adenoid or medullary cancer presents an entirely different picture in this second stage. Constipation may or may not be one of its features. Exasperating, frequent calls to defecate, resulting in the passage of small amounts of gas and mucus, with or without blood, are the principal symptoms. The patient may have to attend the toilet fifteen or twenty times a day and as many times at night, and yet have no satisfactory movement. Ordinarily this tendency to diarrhoea is quiescent during the night, but the patient must repair to the toilet immediately upon rising in the morning. This constitutes what is ordinarily known as *morning diarrhoea*, and it is one of the most characteristic features of malignant disease of the rectum and sigmoid. The first one or two passages after the patient arises consist in nothing more than mucus, blood, and pus; after this the patient may have a very satisfactory faecal movement, and then during the rest of the day he is annoyed by the teasing, unsatisfactory calls to stool. The hæmorrhages may be constant and slight, or periodical and exhausting; the blood is sometimes black and decomposed, at others bright red. In the first instance it generally comes from neoplasms of the sigmoid or high up in the rectum; in the latter from those in the ampulla or sub-peritoneal area.

Pain in these cases is marked. It may be intermittent or constant; dull, vague, and shooting through the pelvis or down the extremities, or it may be sharp, stabbing, or burning. It is often influenced by posture. Some cases are only comfortable when lying down, others can not sit with any comfort, and still others are more free from pain when standing up. It may only occur at or after defecation, but in certain cases this function seems to have no influence upon it. In cases in which the sphincters are involved, the pain is ordinarily greater than where the cancer is higher up. In these instances incontinence of feces is sometimes noted, owing to the infiltration of the muscle and its consequent inability to contract.

Constitutional symptoms, such as loss of appetite and weight, anæmia, rapid heart action, and increasing sallowness of the skin, begin to manifest themselves at this period, and local examination exhibits a variety of conditions. Sometimes a smooth, hard, lobulated mass protrudes into the rectum, involving the entire circumference of the gut, and almost occluding its caliber; at others the mass is equally as prominent, but attached to a limited portion of the circumference. Sometimes the

finger comes in contact with a proliferating cauliflower-like growth, slimy to the touch, and between the lobes of which it can be insinuated; at other times there is no protrusion into the gut, but a distinct narrowing of its caliber by an indurated deposit extending around the gut or involving only a portion of its circumference, in the center of which is a deep, excavating ulcer, the edges of which are sharp, hard, and scalloped (Fig. 255).

In the medullary type the symptoms are more severe, the pain is greater, the discharges more profuse, the loss of flesh and strength more rapid, and the involvement of neighboring organs occurs at earlier peri-



FIG. 255.—MEDULLARY CARCINOMA OF THE RECTUM.

ods. Digital examination in these cases reveals a dense ulcerated mass, the edges of which are sharply defined and surround a deep crater-like cavity. Occasionally the finger comes in contact with a soft, pulpy, brain-like mass, more or less isolated, friable, and easily breaking down upon pressure. Finally, one observes at times a moist, slimy, soft condition of the mucous membrane, accompanied by a fluctuation in the walls of the gut, together with a distinct reduction in its caliber. All of these conditions are associated with a foetid, gangrenous, disgusting odor, which Allingham states is pathognomonic of the disease. The proctoscope reveals the appearance of these conditions in a remarkable manner, and in sites in which it is impossible to feel them with the finger. It may show in the adenoid variety a smooth, lobulated tumor protruding into the rectum, covered by dark-red congested mucous membrane with enlarged veins and bathed in viscid mucus, or a condylomatous growth, grayish-white in its appearance, secreting a muco-purulent fluid and bleeding easily upon touch. In medullary cancers it exhibits a dense, irregular, ulcerated mass protruding into the rectum, or a deep, excavating ulcer, with sharp, well-defined borders and bright-red proliferating granulation, or dull, grayish, and sloughing. Finally, in the gelatiniform or colloid types one sees a grayish or bright-red oedematous mucous membrane, lobulated or elevated at points by nodules underneath, and secreting an abundant sanious mucus.

In the third or degenerative stage, the symptoms are all more marked. The digestion is exceedingly deranged, the anæmia becomes excessive, the skin is pale, dry, parchment-like and covered with fine silvery scales. General debility progresses, and the countenance of the patient exhibits an anxious, foreboding appearance. The hæmorrhages become more frequent and abundant, the diarrhœa is more distressing, and the fæcal passages less satisfactory. The pains are more acute and more constant, the mucous discharges are supplanted by excessive purulent secretions, and the odor from the parts becomes more and more offensive. On the whole, the patient presents a typical picture of mild septicæmia.

With these one observes in this stage other symptoms connected with the different organs of the body, such as the genito-urinary, glandular, and secretive organs. Anuria and dysuria are very frequent complications, either constant or periodical. The total suppression of urine may occur through involvement of the ureters or of the kidneys themselves. Irregularities of the menstrual functions are frequently observed, and hepatic derangements are among the most frequent complications. Absolute obstruction of the intestine rarely if ever occurs from carcinoma of the rectum itself. This may be due to the amplitude of the rectal ampulla, to the marked tendency of growths to ulcerate in this portion, or, finally, to the fact that the parts are most directly influenced by

enemata. In the writer's opinion, it is chiefly due to the fact that the types of cancer which occur most frequently in the rectum (adenoid and medullary) are soft and compressible or friable, and they degenerate or ulcerate chiefly upon the surface, thus keeping the caliber of the gut open. He has never observed a case of complete obstruction from carcinoma of the rectum. On the other hand, this accident is always imminent in carcinoma of the sigmoid flexure, owing to the fact that the type of growth which occurs in this location is often scirrhus, which does not ulcerate or degenerate easily, but constantly and persistently contracts the caliber of the gut in which it occurs. The obstruction even here is not usually absolute, but due to the impaction of some foreign body or hard faecal mass in the narrowed caliber. Above and below carcinoma in the intestine the wall of the gut is inflamed and very thin. Ordinarily marked ulceration is found above the stricture, and it is at this site that rupture or perforation takes place, if at all.

Aside from the reflex disturbances of digestion referred to heretofore, there are other complicating symptoms which arise in the course of carcinoma of these organs; among these auto-infection or mild septicaemia is the most constant. This may be brought about by retention and putrefaction of faecal material above the neoplasm, or it may be induced by traumatic lesions of the mucous membrane from the passage of hard faecal material, which lesions become infected. In the first instance this sepsis manifests itself as a sort of malaise with slightly elevated evening temperature, lack of energy, and loss of strength. In the second, it occurs as periodical crises with chill, fever, and great exhaustion. This type resembles very much the sepsis of surgical kidney in its early stages. In other cases perirectal abscesses develop, which sometimes result in fistula or perforation into other organs, such as the bladder, vagina, or peritoneal cavity. These cases are also accompanied with high temperature, chills, and septic symptoms. They have a tendency to result in extensive gangrene and sloughing similar to that seen in idiopathic proctitis.

Aside from these septic complications, inflammatory conditions around the neoplasm and between the rectum and other organs are frequently met with. The bladder, prostate, and seminal vesicles may all become attached to the carcinomatous rectum through inflammatory processes without being involved in the neoplastic change. The author has twice removed portions of the prostatic gland and seminal vesicles in excision of cancer of the rectum, and found that these organs were entirely free from carcinosis. The same may be said with regard to the vaginal septum. Inflammatory deposit here may cause a matting together of the walls of the two cavities without any carcinomatous change

taking place in the parts; indeed, this sœptum may be perforated through simple destructive ulceration below the carcinoma. In one instance in which this took place the author was unable, after various examinations, to find that the rectum or vaginal wall at the site of the ulcer was involved in the carcinomatous process which existed at a higher level. The peritoneal *cul-de-sac* may also become obliterated by this perirectal inflammation; under these circumstances the opening of the cavity during extirpation is rendered very difficult. These facts are important, because they indicate that the attachment of a carcinomatous rectum to any of these organs is not pathognomonic evidence of their involvement in the malignant processes. Thus, the author has seen 3 cases in which the rectum, uterus, and ovaries were all removed for carcinoma, and yet upon the most careful examination no involvement whatever of the uterine organs could be determined. In two other instances in which the peritoneal *cul-de-sac* was obliterated and the rectum attached to the uterus, this adhesion was broken up and the rectum extirpated, and no carcinosis of the uterine organs followed. It is admitted that all of these organs may be involved by extension in continuity of the carcinoma, but adhesion does not always indicate involvement in the malignant process.

Lines of Extension.—Carcinoma of these organs extends, by continuity, through the lymphatics, and possibly through the blood. The lines and method of extension are largely governed by the seat of the disease.

In anal cancer the disease usually extends, by continuity in the skin surrounding the anus, into the scrotum, vulva, vagina, the ischio-rectal fossa, and sometimes upward into the rectum. Occasionally in these cases fistulous tracts develop which are found to partake of the epitheliomatous nature of the growth. Lymphatic extension of cancer from this region travels in the line of the inguinal vessels and glands. Both the superior and inferior chains may be involved. Quénu and Hartmann have called attention to the fact that when these cancers invade the ischio-rectal fossa, they may extend along the line of the middle hæmorrhoidal lymphatics, thus involving the hypogastric chain of glands. The glands always partake of the nature of the original growth, which is usually squamous epithelioma in this region, but it may be of the adenoid type. Occasionally the glands become enlarged and tender through infection without presenting any carcinomatous changes.

Cancer in the subperitoneal portion of the rectum extends by continuity to the prostate, urethra, seminal vesicles, bladder, vagina, uterus, and coccyx (Quénu and Hartmann, Pasteau, Schoening, Leube, Fayard, Rabe). Ganglionic extension occurs in the retro-rectal and hypogastric chains. The lateral vertebral lymphatics may also become involved

from cancer in this location (Ball, Fayard). In some cases the ureters seem to become involved through this process, and not by extension (Fayard, Thesis, Lyons, 1891, p. 60).

Cancer of the suprapерitoneal portion extends by continuity to the bones of the pelvis, to the peritonæum, and to the uterus, bladder, or omentum. In one instance, in which the abdomen was opened to determine the extent of the disease, the whole peritonæum and greater omentum was studded with myriads of little gelatinoid nodules, which proved to be colloid cancers. Ganglionic extension from these growths is not frequent. When it occurs it extends along the antero-vertebral chain, involving sometimes the hypogastric glands.

Metastatic deposit or generalization of the cancer may occur from carcinoma in any of these locations. It is not the rule, however. The liver is the organ generally affected. Whether this occurs through the blood-vessels or through the lymphatics is not positively known. Hoehenegg and Rinne (Wiener klin. Woch., 1889, Nos. 26, 27, 28) have collected a number of cases in which this organ was attacked both before and after extirpation. The author has observed it in 6 cases, 2 of which were recurrences after operation. The pancreas (Cripps, *op. cit.*, p. 372), the lungs (Luys, Soc. anat., February 5, 1897; Quénu and Hartmann, *op. cit.*, vol. ii, p. 137), the ovaries and skin, the kidneys (Schuh, Abhandlung d. Chirurgie und Operat. Lehre, Wien, 1867), and the axillary and subclavicular glands may all become involved. Sometimes the small intestine becomes attached to the rectum or sigmoid affected with carcinoma, and may become involved in the growth. The author has seen one case in which this occurred from carcinoma of the rectum, the small intestine becoming adherent and involved in the peritoneal *cul-de-sac*; and another in carcinoma of the sigmoid, in which both portions of the intestine were attached to the brim of the pelvis, the periosteum of which was involved in the growth, together with the left iliac vessels. Kirchoff and Beckel (Quénu and Hartmann, *op. cit.*, vol. ii, p. 139) have related cases in which this complication has occurred.

Diagnosis.—Carcinoma is not likely to be confounded with any other condition of the rectum and sigmoid than multiple adenomata, papilloma, sarcoma, proliferating proctitis, and fibrous stricture. The extreme tendency of the first two to be transformed into, or when removed to recur in the form of carcinoma, renders it wise to treat them as such in the beginning. From these facts differentiation in these cases derives a reduced importance so far as treatment is concerned. For the purposes of prognosis, however, the neoplasms should be distinguished as far as possible, for one is much more justified in giving a favorable opinion in cases in which malignancy has not already appeared than where it

has. The distinctive features are briefly enumerated in the following columns:

ADENOMA	PAPILLOMA	CARCINOMA
Generally in adult life, but may occur in children.	Occurs in adult and advanced life, rarely if ever seen in children.	Usually in advanced life, but may occur in youth.
More frequent in females.	No predominance in either sex.	More frequent in men.
Distributed over large areas, even the entire colon.	May be single or two or three in number closely aggregated.	Is generally limited in area, but may involve the entire rectum.
Tumors vary greatly in size, and rarely coalesce.	May attain very large proportions.	Base is always indurated, and involves the entire thickness of the gut.
They are soft and elastic to the touch.	Soft and shaggy or villous to the touch.	
Attached to the rectal wall by a pedicle or base of normal mucous or sub-mucous tissue.	Attached to the rectal wall very superficially. The pedicle may be long and the base indurated.	
Diarrhœa and hemorrhage are the earliest symptoms.	Discharge a peculiar gluey mucus. Hemorrhages are irregular and periodic. Constipation is more frequent than diarrhœa.	Constipation is the rule in the early stages; diarrhœa in the later. Mucous discharges precede those of pus and blood.
	Anæmia and physical exhaustion come on quite early.	Constitutional symptoms appear after tumor ulcerates.
		Extension takes place by continuity, metastasis, and through the lymphatics.
The odor of the secretions is not unusually offensive.	No particular odor.	Odor <i>sui generis</i> .

While some of these symptoms are similar and overlap one another, to the experienced clinician there is rarely any difficulty in distinguishing the typical growths. In those transitory stages, where the benign is undergoing transformation into the malignant type, nothing short of complete extirpation and thorough examination of the entire growth can absolutely distinguish one from the other. In doubtful cases, indeed in all cases, it is wise to remove a section of the growth for microscopic examination, but one should not place too much confidence in negative reports with regard to malignancy. The growth may be perfectly benign in that portion from which the section was taken and markedly malignant in other portions. The fault is not with the methods of examination or with the pathologist; it lies in the nature of the neoplasms.

The most prominent and accessible portions of these growths are often benign, while the deeper portions are absolutely malignant. We maintain this from numerous experiences, notwithstanding it is claimed that the transformation begins on the surface. While, therefore, microscopic examination is of great assistance in corroborating clinical evidence, it should not shake the clinical conviction of an experienced surgeon as to malignancy in one of these cases. The author has removed 5 neoplasms of the rectum which had been pronounced benign from microscopic examination of the sections taken for diagnosis, and has in each instance found his clinical conviction corroborated by more complete and thorough microscopic examination of the growth after its removal.

It is important in obtaining specimens for microscopic examination not to crush them. This can be done by use of nasal scissors (Fig. 256) or the specimen forceps (Fig. 254). The bite of the latter consists in



FIG. 256.—SCISSORS EMPLOYED FOR OBTAINING SPECIMENS OF RECTAL GROWTHS.

two elliptical Volkmann spoons, which cut out the specimen and hold it in the cavity formed by their approximation; the instrument is 12 inches long, and was devised for operation through the sigmoidoscope. By it specimens may be obtained from any part of the pelvic colon.

Between carcinoma and proliferating proctitis the diagnosis is not very difficult, although many of the symptoms are similar. In the latter there is generally a history or other manifestations of syphilis; the disease is uniformly distributed throughout the rectum; diarrhoea is present from the beginning, and the discharge of muco-pus is abundant; there is little pain, and the protruding granulations are soft to the touch and without any indurated edges. These symptoms are sufficient to distinguish it from carcinoma, but one may still further rely upon the pathognomonic odor in the latter disease.

Between scirrhus cancer and fibrous stricture it is almost impossible to make a diagnosis, except by complete excision and microscopic examination. The early symptoms of the two are practically the same. In fibrous stricture there is usually a history of inflammation or ulceration, but this may also be true in scirrhus carcinoma. Scirrhus rarely occurs in the rectum, and fibrous stricture is quite as rare in the sigmoid. Thus the site of the disease may be of importance, but it is not absolutely diagnostic. Where the growth can be easily reached a nodular condition may be felt in scirrhus which is not present in pure fibrous stricture. Glandular involvement is sometimes spoken of as a diagnostic symptom, but this occurs very tardily even in scirrhus. Through the proctoscope the mucous membrane over scirrhus appears congested, thickened, or ulcerated; over fibrous stricture it is pale, smooth, shining, and rarely ulcerated.

The fact that carcinoma may present so few subjective symptoms, all of which are explicable by other conditions, emphasizes the importance of local examination in all cases in which diarrhoea, constipation, obscure digestive derangements, pain in the sacral region, and discharges of mucus, blood, and pus from the anus exist. The means of such examinations are the finger and pneumatic proctoscope. So far as it goes, the finger is by far the most satisfactory, but above $4\frac{1}{2}$ inches one must depend upon the instrument. Ordinary tubes, specula, sounds, and bougies should never be employed in these cases, for the operator should always be able to see the space into which the instrument is directed. Even the introduction of the finger should be made with the greatest gentleness, for the weakened walls of the gut may be easily torn. With the pneumatic proctoscope, after the sphincter has been passed, the gut is distended by air and the tube is pushed upward through the dilated caliber without coming in contact with the walls of the gut until the tumor or contraction is reached. The degree of distention is never so great as to endanger the integrity of the walls, for the air either escapes upward into the intestine or outward through the anus whenever any tension is produced. By this means the exact location and appearance of the disease may be determined up to the highest limits of the sigmoid flexure. In Plates VII and VIII are illustrated the appearance of two carcinomas of the sigmoid. The small, round figures show the growths as they appeared through the proctoscope; the larger ones show their appearance immediately after excision. The importance of this method of diagnosis in tumors situated above the reach of the finger can not be overestimated.

In the diagnosis of cancer, either by the finger or the proctoscope, it must always be borne in mind that the integrity of the mucous membrane does not in any wise indicate the limits of the disease. Carcino-

ma spreads in the submucous and muscular walls of the gut, and the mucous membrane may be perfectly healthy over large areas in which the deeper tissues are involved in the carcinomatous process.

Epithelioma of the anus may be mistaken for fissure, condyloma, or tubercular deposits. From fissure they are distinguished by their induration, their tendency to scab over and extend in area, and by their seat, which is usually upon the folds and not between them. From condyloma they may be distinguished by their density, disposition to bleed, and indurated base. From tubercular deposits they are distinguished by their irregular shape, bright-red color, and lack of any tendency to undermine the skin. Occasionally, where an epithelioma develops from a prolapsing hæmorrhoid, it may be difficult to distinguish it from the granular condition which is sometimes seen on these hypertrophies. Finally, as Quénu and Hartmann have pointed out, one should bear in mind the resemblance between these neoplasms and the condition produced by actinomycosis. The diagnosis in all these anal cases may be positively established by microscopic examination, which will reveal the epithelial nature of the cancer whenever it exists.

It has been recommended from time to time that in cases of cancer situated high up in the rectum, the entire hand should be introduced for the purposes of diagnosis. The author is convinced that this is not only a dangerous, but useless procedure, and does not hesitate to condemn the practice. Instrumental examination has reached such a stage of perfection that this method can no longer be countenanced.

Finally, one should not forget to mention and recommend laparotomy as a means of diagnosis in these cases. This procedure is not of so much importance to determine the existence as the extent of a neoplasm. It is, in fact, one of the chief means of deciding upon the operable character of high carcinomas. It not only furnishes an accurate knowledge of the condition of the growth and the extent of its involvement of other organs, but enables one to determine the ganglionic extension along the vertebral chains. The incision for such an examination should always be made in the same line as that for inguinal colotomy, in order that if one deems it necessary he may at the same time produce an artificial anus, either temporary, with a view to excise the growth, or permanent in case the conditions demand it. It is not sufficient simply to introduce the index finger in these cases, but the incision should be made large enough to admit the whole hand, which should be introduced in order to examine the entire pelvic cavity, the prevertebral glands, and also the surface of the liver. By this means the author has been able twice to determine the uselessness of any attempts at removal of the carcinoma, and under modern aseptic precautions the procedure may be said to be practically without danger.

Treatment.—The treatment of carcinoma of these organs is the most serious problem that the rectal surgeon ever has to face. The majority of these cases in the past have ended fatally regardless of what method has been employed. In a few an apparent cure has been obtained, but the percentage is small. The following questions must be answered in every case: Is there reasonable hope of cure by extirpation? Will the patient's life and usefulness be prolonged by this operation, and his sufferings be relieved? Or will these ends be attained in a greater measure by palliative methods, such as irrigation, curettage, opium, and, if necessary, an artificial anus or entero-anastomosis? Between these methods of treatment the profession has vibrated for the past three-quarters of a century.

Before the introduction of aseptic surgery the immediate mortality from extirpation of cancers of the rectum and sigmoid was so high that many surgeons claimed the operation was never justifiable. More recently this mortality has been much reduced, and many of those who formerly condemned the operation now favor it in properly selected cases. If the ultimate were proportionately as good as the immediate results, few surgeons would deny patients the opportunity of radical cure with four chances out of five in their favor. Unfortunately, recurrences *in situ* or generalization of the disease has proved so frequent after these operations that one can not promise with any degree of certainty that the growth will not return within one or two years, even if the patient survives radical and complete extirpation. The experience of any one surgeon is always too limited to establish reliable conclusions; some few have operated 40, 50, or even more than 100 times, while a large majority who report their cases have operated from 1 to 15 times. The only just estimate of this procedure must be deduced by collecting large numbers of operations done by different surgeons. By this means the average results, in average hands, and in an average class of patients, are obtained.

One set of operators confine themselves to carcinomas low down and removable by perineal dissection; the mortality in these cases is comparatively low. Another class pays less attention to the elevation of the tumor, but confines its operations to those cases in which the growth is absolutely confined to the rectal wall, is freely movable, and has not presented local symptoms longer than six months; the mortality in these cases is still comparatively small. A bolder and more ambitious class, however, attacks cases regardless of the attachments of the tumors to the pelvic organs or the bony frame; in this class the immediate mortality and the percentage of early recurrences are exceedingly high. The actual facts are only obtained by combining the results of all.

The author and his associate, Dr. George H. Wellbrock, have col-

lected from literature and private communications a total of 1,578 cases of extirpation of the rectum done since 1880, with a mortality of 319, or 20.2 per cent. With slight differences this is practically the conclusion of Finet (*Exérèse dans le cancer du rectum*, Paris, 1896), who collected 375 cases, Carl Vogel (*Deutsch. Zeitsch. f. Chir.*, April 19, 1901), and Hupp (*Med. News*, September 28, 1901), who have made similar compilations. In a summary of cases made in 1896 (*Jour. Amer. Med. Ass'n*, 1897), drawn largely from private communications and numbering 249 in all, the author showed a mortality from these of only 13.5 per cent, and firmly believed at that time that this mortality would be materially reduced as the technique of the operation improved and our knowledge of how to select operable cases increased. He is compelled to admit at present that these hopes have not been realized. The mortality from this operation in the past five years appears to have increased rather than decreased. This may be explained by the following facts: More difficult cases are operated upon, wider dissection for the removal of glands is employed, less experienced surgeons are attempting the operation, and our aseptic technique has not kept pace with the boldness of operators. Assuming, however, that these records are correct and that 1 in every 5 cases of cancer of the rectum dies from the operation, there would still be few who would hesitate to take four chances in five if promised a radical cure, or even a prolonged extension of life. But how many cases are actually cured by extirpation, and to what extent is life prolonged in those not cured? The first question it is impossible to answer, because there is such a diversity of opinion in regard to the period after extirpation at which a patient may be said to be cured. Formerly it was held that when a patient, having been operated upon for carcinoma, had survived three years without any recurrence, he might be said to be well. Recently, however, recurrences have been observed six, eight, and more years after the operation, and these cases are added to the mortality from recurrences. It is a question whether such tardy recurrences, except when *in situ*, ought not to be considered new developments and not returns of the old disease. These cases may be left out of account from the fact that if such prolonged freedom from so malignant a disease can be obtained, the results will be so far in advance of anything which can be accomplished by any other treatment that no comparison can be instituted.

When it is recalled that the disease is absolutely fatal when left alone, and with few exceptions within one year, any procedure which prolongs life two, three, or more years must be considered most favorably, especially if it brings comfort and relief of suffering to the patient. Treatment by extirpation arouses hope of a radical cure, and thus adds buoyancy and comfort to the patient's mind; this hope, it is true, is bought

at a price, consisting of one chance in five of death, but this is four times as many chances as he has by any other treatment. It offers a prolongation of life, as the average length of life following extirpation is two years and seven months, calculated from 602 cases which have been followed; this is nearly three times as long as that given by non-operative treatment, and almost twice as long as that furnished by the palliative methods of colostomy and entero-anastomosis. It offers a distinct chance of radical cure, of life without recurrence for a certain number of years. The percentage of such cures is very difficult to determine; that observed by various operators is far from uniform, as the following table, taken from Hupp's article, will demonstrate. This is based upon the assumption that three full years without recurrence constitute a cure of the disease:

Table

NAME.	Number of operations.	Cures.	Percentage.
Kocher.....	35	10	28.5
Czerny.....	109	16	14.6
Kronlein.....	63	10	16
Bergmann.....	46	8	17.4
Madelung and Garre.....	53	6	11.3
Kraske.....	80	11	13.7
Kuster.....	95	16	16.8
Hoeneegg.....	93	12	12.9
Mikulicz.....	66	6	9
Average percentage of cures.....			14.8

It is to be observed that this percentage is based upon the total number of cases operated, and not upon those that survived the immediate effects of operation. To these may be added the experiences of the author, who has operated upon 32 cases, with an immediate mortality of 6—18.7 per cent. Of the other 26, he has been able to follow 16 of them for one year or more. Of these there are living without recurrence, 1 ten years, 1 eight, 1 six, 2 (1 sarcoma) five and one half, 2 four, 9 between two and a half years and one year; and 4 have died from recurrences—1 in six months, 1 in eleven months, 1 in fourteen months, and 1 in two years. In this list there are found 7 out of the total 32 cases (21.8 per cent) who have survived the period of four years or more. From these facts, it may be concluded that on an average 1 in 5 cases will live three years or more without recurrence.

What does the operation offer in relief of pain and maintenance of normal functions so long as the patient lives? The relief of pain is complete in the large majority of cases. In the statistics furnished by Hupp absolute sphincteric control was retained in 30 per cent, relative control in 60 per cent, incontinence in 10 per cent (taken from the personal experience of Kronlein). In the writer's experience in 26 cases

which survived the operation, complete incontinence was observed in 2, partial incontinence in 7, and comparatively perfect sphincteric control in 17. All the latter cases were instances of resection by the sacral or abdominal methods without involvement of the muscles. Other complications, such as stricture, posterior fistula, and abnormally placed ani do occur, but they are of such minor importance compared with the disease itself that they need scarcely be considered except in relation to the different methods of operating.

While the average length of life made up from the entire number of operations performed is comparatively small, there are numerous instances in which the operation has been followed by no recurrence in long periods. The following table brings this out in an interesting manner:

Table

NAME.	Number of cases.	Number of years without recurrence.
Cripps.....	2	4
".....	1	5
".....	2	6
".....	1	12
Quénu.....	2	3
".....	1	6
".....	1	8
J. Boeckel.....	1	6 months.
".....	1	7
".....	1	6
".....	1	8
Kocher.....	1	4
".....	1	5
".....	1	6
".....	1	8
".....	1	10
".....	1	14
".....	2	16
Ball.....	1	6
".....	1	8
König.....	1	4
Hildebrand.....	1	5
Reclus.....	1	7
Caspersohn.....	2	7
Labe.....	1	7
Richelot.....	1	7
Keen.....	4	4
".....	1	3
Author.....	1	10
".....	1	8
".....	1	6
".....	2	5½
".....	2	4

There are no statistics to determine the comparative results of operations done early in the course of the disease and late in its development. Personal experience and the meager reports in published cases show that the longer the symptoms have existed the less chance will there be of

immediate or permanent recovery. A fact of much more importance than this, however, in regard to prognosis is, that the younger the patient the less are the chances of recovery, and each year we are seeing more cases in early life. In the 1,578 cases studied, those in which the age is given show a gradual decrease in mortality and recurrence as the ages increase. Not a single case of radical cure has been reported under the age of twenty-five years. Under thirty years of age the immediate mortality is over 30 per cent, and the recurrences approximate 60 per cent. Fifty to sixty years seems to be the most favorable age for operation. The mortality in these cases is about 12 per cent, and the recurrences are less than 40 per cent.

Causes of Death following Extirpation.—A study of the causes of death shows that there is reason to hope the high mortality from this operation will some day be reduced.

The causes of death, as determined by Hupp in a collection of 881 cases with 171 fatalities, are as follows:

Sepsis and pyæmia.....	46,	26.8 per cent.
Peritonitis	37,	21.6 "
Collapse and heart failure.....	32,	18.7 "
Pulmonary affections.....	21,	12 "
Miscellaneous causes	35,	20 "

(Archiv für klin. Chir., 1900, S. 309.)

In the collection of Finet there were 76 deaths due to the following causes:

Peritonitis.....	24,	31 per cent.
Septicæmia.....	13,	17 "
Pyæmia	2,	2.6 "
Collapse.....	16,	21 "
Gangrene of the rectum	3,	3.9 "
Pulmonary complications.....	4,	5 "
Hæmorrhage	1,	1 "
Diarrhœa.....	1,	1 "
Iodoform poisoning.....	1,	1 "
Miscellaneous causes	11,	14 "

Quénu and Hartmann say, in discussing the latter figures, that if the cases of peritonitis, septicæmia, gangrene, and pyæmia were all united under one head of sepsis, we would have a mortality from this cause of over 60 per cent, and even this is below the reality. They believe that all cases dying within the first thirty-six or forty-eight hours and diagnosed collapse, succumb to a form of acute sepsis characterized by low or subnormal temperature, quick pulse, and suppression of urine. The pulmonary complications, either early or late, they claim are due to the same cause; and on the whole they do not consider it an exaggeration to state that full 80 per cent of the mortality from

operations of this kind are the result of some form of sepsis (*Chirur. du rectum*, t. ii, p. 132). The author is entirely in accord with the views of these eminent surgeons; indeed, he believes that if gangrene and chronic exhaustive suppuration be added to the category of sepsis, the deaths from this cause would amount to more than 90 per cent of all fatalities. The high mortality from this operation, therefore, is due, not to the magnitude or difficulty of the procedure, but to infection; we have not arrived at that stage of perfection in aseptic technique in this variety of operations that we have in many others. Carelessness in detail is the cause of much of this. The author has seen various operators do extirpation of the rectum, and time after time during the procedure introduce a finger into the gut and back into the wound. It is absolutely impossible to sterilize the intestinal canal, however much care is taken, and if this practice is followed by many surgeons, it will account for the high percentage of infections and the great mortality due to this cause. Much of this is avoidable. Another cause of high mortality is too great boldness in operating, undertaking impossible cases. It is a question how far this cause can be avoided. Had the author refused to operate in 2 such cases instead of yielding to the importunities of the patients, the mortality in his series of cases would be 12.5 per cent; but if the patient demands it, has the surgeon a right to refuse him even one chance in a thousand for his life?

While extirpation offers a much smaller probability of permanent cure than could be wished, and while even this prospect must be purchased at the price of one chance in five of death, it still offers to these unfortunate sufferers relief from pain, a surcease from the inveterate and uncontrollable diarrhœa, a cessation for considerable periods, at least, of the excessive discharges and frequent hæmorrhages, and, finally, a hope, though feeble and faint yet far-reaching in its influence, of eventual cure. In contradistinction to this, what has the palliative treatment to offer? A relief from pain through the administration of opiates or through diversion of the fæcal current, either in the form of an artificial anus or through entero-anastomosis. There is absolutely no proof that either of the latter procedures retards the extension of the disease in continuity or by metastasis. In certain instances they relieve the pain to some extent, but never to the same degree as extirpation; they undoubtedly improve the digestive functions and control the diarrhœa, which is annoying and exhausting; they reduce septic absorption, and consequently prolong life, and the mortality from the operations is very small. They offer, however, no hope beyond a lethal end in about one and a half years. The modern methods of performing colostomy make it a less disagreeable and disgusting feature than formerly, as will be described later on; but the very fact that the fæcal

movements must be discharged from an abnormal aperture; that bandages, trusses, or fæcal receptacles must be worn at all times in order to prevent accidental fæcal escape and mortification to the patient, keeps constantly before his mind the fact that the fatal malady still exists, and it has therefore a depressing rather than an encouraging influence. In short, these methods offer the patient and his friends absolutely no hope of cure, only a relief from some of the disagreeable symptoms, and then resign him to fate and the euthanasia of opium until the end appears.

Indications and Contraindications to Different Methods of Treatment.—It is clear from the foregoing paragraphs that the author is in favor of extirpation in all suitable cases of carcinoma of the anus, rectum, and sigmoid. It is believed, however, that a more careful discrimination should be made in the cases selected; to this end the reader is invited to a closer study of the indications for radical treatment.

Indications for Extirpation.—In a general way it may be said that extirpation is indicated when the growth is movable and does not involve other organs; when no metastasis or ganglionic extension has occurred; when the patient's physical condition is such that he is able to withstand the shock of operation, and when marked cachexia is not present.

It is contraindicated when other pelvic organs or the bony frame are involved; whenever the disease has extended to the remote lymphatics; when there is positive indication of the generalization of cancer exemplified in nodules upon the liver, in the skin, or in other remote organs; in low physical conditions with rapid pulse, cachexia, and periodical elevations of temperature. It is specially contraindicated in cases with marked digestive disturbances. Recovery after these operations depends largely upon the ability to assimilate food and resist infection, and if the digestive functions are deficient these indications can not be met.

It is not always wise, however, to adhere too closely to these indications. The rectum may be adherent to the prostate, bladder, or uterus through simple inflammatory processes, and the latter organs may be absolutely free from malignant disease; the liver may be enlarged from congestion or other causes in cases with carcinoma of the rectum, and yet not be involved in the malignant process; the growth may be firmly bound down to the sacrum by inflammatory bands without the periosteum partaking of the malignancy. On this account, Quénu, Czerny, and Bardenheuer (Quénu and Hartmann, *op. cit.*, vol. ii, p. 237) do not any longer hesitate, when it is only a question of adhesion to the prostate and seminal vesicles, to extirpate the growth with parts of these organs, always respecting the urinary tract. Kelsey (*Surg. of Rect. and Pelvis*,

1897, p. 287), however, says he has ceased attempting even these cases. The author is in accord with the French surgeons on this point, and would not hesitate to operate on account of such adhesions. Frequently it is impossible to determine the ganglionic extension through rectal examination and abdominal palpation. One of the many advantages of preliminary colotomy consists in the opportunity of closely examining the parts and determining whether or not this has occurred. It also enables one to examine the bladder and uterus so thoroughly that it is possible to determine whether the malignant process has extended to these organs, or whether the adhesions are simply of an inflammatory nature (Schwartz, *Revue clin. et de thérap.*, 1890, No. 42; Adamski, *Th. de Paris*, 1899, No. 97; Quénu and Hartmann, *op. cit.*, vol. ii, p. 237). When the latter is the case, extirpation may be attempted with fairly good prospects of success.

The type of the tumor should always be considered in determining for or against operation. The prognosis is much more favorable in scirrhous and adeno-carcinoma than in the medullary and squamous varieties. In the latter, ganglionic and metastatic extension occur at an earlier period than in the former, and recurrences are therefore more frequent.

With regard to involvement of the vaginal wall, it would seem that this should not form a very strong contraindication to extirpation of carcinoma of the rectum. As a matter of fact, however, experience teaches us that in the majority of such cases generalization has already occurred, or it comes on early after operation. This complication should therefore be considered a very serious one.

The rule formulated by Van Buren that no cancer of the rectum should be removed, the upper limits of which could not be made out by digital examination, is no longer followed. The tolerance of the peritonæum to invasion under ordinary aseptic precautions renders any limitations with regard to the height of the tumor no longer necessary. Those low down may be removed by perineal methods, those in the ampullary or upper portion of the rectum by the sacral route, and those high up in the rectum or sigmoid by the abdominal or combined methods. The area involved by the tumor may be a contraindication, from the fact that the more extensive the growth the more likely is there to be involvement of the neighboring organs, ganglionic extension, or generalization of the disease. Long sections—20, 25, and 36 centimeters—of the rectum and sigmoid have been removed, but death or early recurrence has almost invariably resulted. The author has successfully removed 12 inches of these organs, and the patient still lives twenty-six months after the operation, but such results can not be expected often.

Two other things need to be considered in determining for or against extirpation of carcinoma of the rectum: the desire of the patient and

the preparation of the surgeon. If it is one's ambition to obtain a record for low mortality in these operations, he will adhere closely to the lines laid down above, and decline to operate on any complicated cases. The patient, however, has certain rights which should be respected. He is entitled to know that he is afflicted with a fatal malady and exactly what chances he has for a radical cure of the same. With this knowledge he should have the privilege of deciding for himself whether he will take the one chance of life in comfort, and failing put an end to all his sufferings, or adopt a waiting course, obtaining what relief he can from palliative methods. It is the author's firm conviction that no surgeon is justified to refuse the one chance to be cured of this disease even in the most desperate cases, if the patient elects to take the responsibility of a fatal termination. Such action will not conduce to a lowered mortality in this operation, but in the majority of cases death is preferable to life with such a malady ever slowly and painfully progressing toward the end. One might just as well say that a man has no right to jump from a burning building and thus take the one chance of living, even though a cripple, as to deny these patients the right to choose for themselves. It is the author's practice in such cases to present the facts and probabilities to the patient and his friends, and leave them to decide whether they will choose a palliative or radical course of treatment. In three instances he has been persuaded to operate where it was his positive conviction that no possible good could be achieved; two of these patients died shortly after the operation, the third and most desperate one was restored to health, and when last heard from, over three years after the operation, was supporting his family in spite of the unfavorable prognosis. Thus the end was hastened in two hopeless cases and a useful life was rescued in the third. This case is worthy of particular mention:

Amputation of the Rectum, including the Entire Prostate and Parts of the Urethra and Bladder.—R. G., thirty-five, entered the Polyclinic Hospital, January 9, 1899. He gave an indefinite history of constipation, hæmorrhages, gradually increasing pain, and protrusion from the rectum. The symptoms had existed for over one year, during which time he had been treated for piles almost constantly. From the anus there protruded a wart-like mass, and as far up as the finger could be introduced the rectal caliber was filled by similar neoplasms. The patient was in a most emaciated condition; his pulse was 140, temperature subnormal, and he required thirty-six grains of morphine per day to be made comfortable.

January 15th.—Left inguinal colotomy after Maydl-Reclus method, sphincter dilated, and protruding epithelial mass clamped off. Examination of the pelvis through the abdominal opening demonstrated involvement of the lower posterior wall of the bladder and prostate in the neoplasm. The prevertebral glands were not involved apparently, and the liver was perfectly smooth. The patient improved greatly following the operation; and, after the bowel was opened, he was comparatively comfortable. He was advised against having any further operation done.

February 7th.—Yielding to the patient's importunities, an attempt was made to

extirpate the carcinoma. Six inches of the rectum, $1\frac{1}{4}$ inch of the urethra, the entire prostate, and nearly 1 square inch of the posterior wall of the bladder were removed in doing this. The patient became very weak during the operation, and it was necessary to shorten the procedure as much as possible. It was therefore impossible to accurately close the bladder wound and make any attempt at restoration of the urethra at this time. Length of operation, forty-five minutes.

February 14th.—The patient recuperated rapidly, and gained strength every day.

February 21st.—An attempt was made to close the wound in the bladder and restore the urethra by freshening the edges and drawing the parts together. It was impossible to bring the ends of the urethra together, therefore a drainage-tube was passed along the perineal wound into the bladder, and around this the neck of the latter organ was sutured. Comparatively good union was obtained in this, and the patient was left with a perineal urethra. After the parts healed, the bladder could retain about 2 ounces of urine, but no more, and it was found necessary for the patient to wear a perineal urinal.

The upper end of the rectum, where it was cut off, was not closed or sutured in any way, but simply packed with gauze. At the time the patient left the hospital, March 18th, there was only a slight fistulous tract leading up from the site of the anus to this point. The patient entirely relinquished his morphine habit within three weeks, and was on his feet walking about the ward in two weeks after the second operation.

The results in such cases as this render us bolder to undertake apparently impossible operations. Such attempts are justifiable upon the insistence of the patient, but they should never be urged by the surgeon.

The capability and preparation of the surgeon are of the utmost importance in determining upon this operation. While asepsis is the chief feature in the technique, the time occupied and the control of hæmorrhage are major considerations. Every minute and every drop of blood saved in such a procedure add to the patient's chances of life. Absolute familiarity with the anatomy of the parts and every step of the operation are necessary to success. Blind groping in an unknown field, feeling one's way step by step, results not only in useless loss of time and blood, but frequently in injury of the adjacent organs, such as the urethra, bladder, and ureters. The surgeon who proposes to do this operation should certainly practise it on the cadaver many times before he undertakes it on a living subject.

Indications for Palliative Treatment.—These methods of treatment are indicated when from one cause or another extirpation is not advisable, and as preliminary preparations for the latter operation. Where great weakness and excessive digestive disturbances exist, it should be employed with the view of improving the patient's condition sufficiently to justify extirpation. It should always be employed in some form for eight to fifteen days before extirpation, and it will therefore be described first.

Palliative Treatment.—This consists in diet, antiseptic and astringent irrigation, curettage, cauterization, colotomy, entero-anastomosis, and the free use of opium. The chief element in the prolongation of life in inoperable cases is the ability of the patient to resist infection. Wherever the digestive functions remain good and the patient is properly fed, this resistance is maintained and the constitutional effects of the disease are retarded. Forced feeding with predigested food, milk, egg albumen, meat extracts, and small quantities of well-cooked cereals are always indicated.

Sweets, uncooked starches, fibrous vegetables, and articles containing much detritus should be avoided. Milk diet alone has not been found advisable in these cases, but associated with other aliment it is of the greatest benefit.

Irrigation.—Irrigation of the affected part is indicated, especially in those cases in which there is much discharge associated with a frequent diarrhœa, or in which there is a tendency to hard, lumpy stools. The substances which have been found most satisfactory for this purpose are solutions of boric acid 5 per cent, hydrastis 1 per cent, krameria aq. ext. 5 per cent, bichloride of mercury 1 to 10,000, and carbolic acid 1 to 100.

The method of employing irrigation in these cases depends upon the site of the growth. In those cases low down about the margin of the anus, the solutions may be sprayed upon the parts, a certain portion being carried up into the rectum simply to act as an enema in unloading the bowels. Where the tumor is in the ampulla of the rectum an ordinary rectal irrigator (Fig. 83) should be used with the patient lying upon the side. Where the growth is higher up at the junction of the rectum with the sigmoid or in the latter organ, the irrigation should be carried on by placing the patient in the knee-chest posture, allowing the fluid to run in slowly from a fountain syringe so that it will find its way above the affected area and thus wash out whatever mucus, pus, and fecal material have accumulated above or below the growth. In cases which are too weak to assume this position long enough for the fluid to pass in slowly, a small Wales bougie, Nos. 3 or 4, which is practically a soft-rubber catheter open at the end, may be gently introduced by an expert nurse, and thus the fluid can be carried above the growth. Of course it is always possible that this tube may bend upon itself, and, as said before, there is a certain amount of danger in introducing such instruments, but with a soft bougie of small size this is not very great.

The amount of good which can be accomplished by this dietary and antiseptic treatment does not seem to be appreciated by most writers upon this subject. The author has seen a number of inoperable cases not only hold their own, but gain flesh and strength under it.

In several cases he has seriously doubted his own diagnosis on account of the remarkable improvement. In some cases in which the local condition indicates operative interference, the patient's general condition contraindicates it. In these instances one may occasionally improve the general condition to such an extent that extirpation will become feasible where it was not so at the first examination.

Drugs.—As to therapeutic remedies, little can be accomplished except by the artificial aids to digestion, tonics and stimulants to circulation, and such remedies as prevent fermentation in the intestinal tract. The author is opposed to the administration of opium by the mouth, as it interferes seriously with the digestion, produces hard, lumpy stools which are dangerous in this disease, and it accomplishes nothing in the control of the irritative diarrhoea that can not be accomplished by irrigations and proper diet. For the relief of pain, hypodermics of morphine are admissible, but they should not be too freely used until the disease has progressed to its latest stages. When the hopeless, bed-ridden stage has been reached, then the unlimited administration of the drug should be employed to relieve suffering and quiet mental anxiety.

Curettage.—Where there are no great septic symptoms, but the patient's life is drained by frequent and exhausting hæmorrhages from large, soft, pulpy, inoperable tumors attached to the posterior wall, we may have recourse to curettage for the relief of this condition. If the growth involves the anterior or lateral wall of the gut, this operation is not safe, as one may very easily penetrate the peritonæum; at the same time, in expert and careful hands, the anterior cancerous excrescences may be twisted or crushed off with pressure forceps, and scraped out posteriorly so as to greatly increase the caliber of the gut and check for considerable periods the dangerous bleeding. Where the hæmorrhages are not accompanied with much pain, the author believes this method will give quite as much relief as an artificial anus, and it will render the after-care of the patient less burdensome to the attendants. After the curettage, hot or cold irrigation should be employed to check the bleeding, and afterward a drainage-tube should be introduced into the rectum and firmly packed around with sterilized gauze infiltrated with suprarenal extract or dried persulphate of iron. It is not safe to pack such large cavities with 10-per-cent iodoform gauze on account of the toxic effect of this drug.

Cauterization.—In the same class of cases as those just mentioned, one may employ the actual cautery to control the bleeding. It is slower in its action than curettage, and more likely to result in peritonitis through heat radiation.

Where the growth is low down and the excrescences are of a papillomatous or polypoid nature, they may be grasped with a hæmorrhoidal

clamp, crushed off and cauterized, thus accomplishing the control of hæmorrhage and widening of the rectal caliber. The author is opposed to the use of chemical cauteries in such cases, and believes the Paquelin knife is the only agent which should be employed if this method of treatment is adopted.

Colostomy in Malignant Tumors of the Rectum.—The opinions and experiences of surgeons vary greatly with regard to the employment of colostomy in cancer of the rectum and sigmoid. Some believe that it is never justifiable, others that it is the only justifiable operation which affords these unfortunate sufferers any relief. It is employed to avoid obstruction, prevent hæmorrhage, control diarrhœa, check sepsis, and as a preliminary operation to extirpation. Some surgeons, notably Allingham and Kelsey, claim to accomplish all these ends by this procedure; in the hands of others the operation has not been so satisfactory.

Where the growth is low down and involves the sphincter, an artificial anus will prevent the intense suffering which follows every stool. In some cases it controls the diarrhœal movement, but in others it fails to relieve the unceasing desire to defecate; in these cases small mucous and bloody passages continue from the anus after the colostomy has been done. Usually it checks the septic manifestations, although this is not invariably the case. It undoubtedly improves the digestive functions, and for the first three or four months after its performance the patient gains in strength and flesh. In the control of hæmorrhage it has no distinct advantages over curettage, dietary *régime*, and rectal irrigation. It may check the inflammatory processes around the cancer, but there is no reason to suppose that it inhibits the growth of the neoplasm. That it prevents intestinal obstruction can not be denied, but, as has been stated already, this is a very rare accident in carcinoma of the rectum. In the sigmoid, where scirrhus cancer is somewhat more frequently observed, obstruction is more likely to occur, but in these cases the condition of affairs is usually recognized at a time when extirpation is altogether feasible, and therefore colostomy is not called for.

The writer is not among those who hold that an artificial anus is the most disgusting and distressing condition to which a patient can be subjected. He believes that in many diseases, such as chronic ulceration of the rectum, syphilitic stricture, multiple polypi, complicated fistulas, etc., it is one of our most useful aids. The modern methods of colostomy have rendered the fæcal control so complete that many of the most disgusting features have been obliterated. At the same time it does not appear indicated in carcinoma of the rectum except in the rarest instances. The writer has never seen a case of obstruction from

carcinoma of the rectum, and in 20 colotomies for this disease he has never seen a patient live longer than one year after the operation. It has always been necessary to resort to morphine almost as freely as before the colotomy, and in most of the cases periodical hæmorrhages have occurred long after the fæcal current had been turned aside. He therefore employs it only in inoperable cases where the sphincter is involved. As a preliminary to extirpation of the rectum, colostomy can not be too highly praised. The operation is of such great importance in rectal surgery, and applicable to such various conditions, that it has been deemed advisable to devote a special chapter to its consideration.

Entero-anastomosis.—Under the same conditions as those stated for colostomy, one may employ entero-anastomosis in cases where the tumor is high up in the rectum or in the sigmoid flexure. Where there is sufficient healthy gut below the growth to admit of a union between the upper loops of the sigmoid, the cæcum, or the ileum with the rectum, the portion of the intestine involved in the neoplasm may be thus eliminated from the fæcal tract and all the advantages of an artificial anus obtained without any of its disgusting features.

The operation possesses one great recommendation, in that it produces no constant reminder of the patient's actual condition in the shape of an abnormally placed anus. The fæcal current apparently passes through the normal channels, it produces no irritation of the neoplasm, and is thus far more satisfactory than the permanent artificial anus. It is a more serious and difficult operation to perform than colostomy, but the death-rate from it is not particularly high.

This operation, first performed by Wallh (St. Petersburg med. Woch., February 12, 1889), is chiefly employed for inoperable tumors of the large intestine above the sigmoid flexure. We are able to find but three

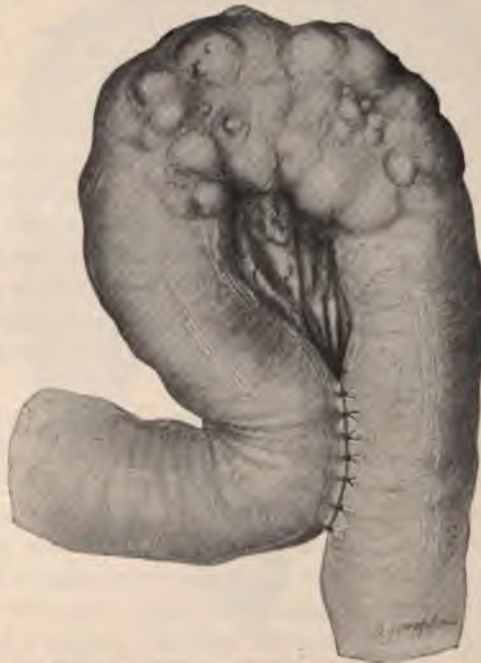


FIG. 257.—LATERAL ENTERO-ANASTOMOSIS.

instances in which it has been employed in neoplasms of the sigmoid flexure (Stimson's, Darling's, and the author's). It consists in anastomosing a healthy portion of the intestine above the growth with one below it. There are two methods employed in its performance. One consists in a lateral anastomosis of two segments, either by the use of



FIG. 258.—ENTERO-ANASTOMOSIS WITH COMPLETE ELIMINATION OF THE FÆCAL CURRENT FROM THE DISEASED AREA.

Senn's bone plates or the Murphy button (Fig. 257). By this method the portion of the intestine involved in the neoplasm retains its connection with the rest of the intestine, and a certain amount of the intestinal contents escapes into it or probably through it. By the second method the portion involved is entirely excluded from the fæcal current. The intestine is cut through above the growth and below it under proper

aseptic precautions. The two ends of the diseased portion are then invaginated and closed by Lembert sutures. The healthy segments above and below the growth are then united by end-to-end suturing or a Murphy button, thus establishing a tract for the fæcal current which has no connection whatever with that portion of the intestine involved in the growth (Fig. 258). The section thus eliminated from the intestinal tract atrophies and appears to occasion no inconvenience, but the neoplasm continues to grow, and eventually ends in death through metastasis.

In the author's case the sigmoid flexure, the ascending transverse and descending colon, and about 18 inches of the ileum were eliminated from the intestinal tract on account of a tumor involving the sigmoid and ileum. The upper end of the rectum was then invaginated and closed, a longitudinal incision was made in its anterior wall, and the upper end of the ileum was then dragged down through this slit, after the manner suggested by Kelly (Fig. 259). The new fæcal tract was perfectly established, and the patient's bowels moved regularly and without pain until his death, which occurred from rupture of the left iliac artery, which was involved in the disease, 45 days after the operation.

While the results from this procedure are comparatively satisfactory in tumors of the colon above the lower loops of the sigmoid, it is rarely

applicable to tumors of the rectum and pelvic colon. In the case referred to, the ileum was involved with the sigmoid in the neoplasm. This would have necessitated an artificial anus being made in the ileum in order for it to be of any benefit, and it is well known that anastomoses made in this portion of the intestine are not only distressing to the patient on account of the fluid condition of the feces at this point, but also followed by rapid exhaustion through the constant diarrhoea which they occasion. In such an instance, therefore, where the tumor can not be removed, this operation is called for; but complications like this in which the sigmoid, the small intestine, and the iliac vessels were all involved, are exceedingly rare.

In addition to these forms of treatment, one should not forget to mention the interesting experiments which are now being made in the treatment of cancer by the X-ray and phototherapy. Most encouraging results have been obtained by the use of these methods in carcinomas, especially of the epithelial type, in other portions of the body, and it is not unreasonable to suppose that the same can be obtained at least in the lower portion of the rectum. Thus far the author has had no experience in their use, and must therefore refer his readers to Williams's excellent work upon this subject and the extensive journal literature of the day. Subjecting the methods to the same test which we apply to surgical procedures—viz., three or four years' freedom from recurrence—it has not been shown that they have effected a single permanent cure; but the period during which these methods have been employed is entirely too short for the practical application of such a test. We can only hope that they will prove as effectual as some of their advocates predict.



FIG. 259.—ANASTOMOSIS OF THE ILEUM WITH THE RECTUM FOR CARCINOMA OF THE SIGMOID AND ILEUM.

SARCOMA

These occur under the two general types of *melanotic* and *non-melanotic* sarcomas; the latter are much more rare in the rectum than the former; the collected cases include 29 of the melanotic and 14 of the non-melanotic sarcomas.

This pigmentation or melanosis is not the all-important element in these tumors, for it may complicate any variety of sarcoma, and has also been seen to occur in carcinoma of the rectum (Roecke, Inaug. Dissert., Freiburg, 1895). This latter is exceedingly rare; there is not another instance recorded of such infiltration of carcinoma of the rectum, and were it not for the very minute report of Roecke, one would feel inclined to doubt the accuracy of the histological investigation. The only plausible reason for its comparatively frequent occurrence in sarcomas is the thinness of the blood-vessel walls, and this explanation is only partially satisfactory.

Form.—Sarcomas occur in the rectum as irregular deposits beneath the mucous membrane. Their shapes are round, elliptical, and sometimes they resemble hypertrophied tonsils. They rarely if ever assume the smooth, plaque-like form of deposit beneath the mucous membrane of the gut, such as is seen in carcinoma.

Their surface is always rough, unequal, "muriform," and the mucous membrane is movable over the growths in their earlier stages, a condition which distinguishes them from carcinoma.

They originate in the submucosa, and at first appear as slightly elevated protrusions into the gut. As they grow they may appear as sessile tumors, and eventually through their own weight, friction of the faecal mass, and the detrusive influence of the intestinal muscles, develop a distinctly polypoid shape.

They may also appear as a general fibrous thickening of the wall of the gut, and thus be mistaken for simple inflammatory stricture (Gremb, Thesis, Paris, 1887, No. 231). Ball also records a case of this kind found in the Dublin Hospital Museum.

The mucous membrane covering sarcomas is at first comparatively normal. When the tumor has grown so large as to distend it and subject it to pressure and friction from the faecal passages, it may become congested, oedematous, or ulcerated, or it may adhere to the growth through inflammatory processes.

Number.—Sarcomas occur in the rectum singly or multiple. Ball (*op. cit.*, p. 325) has related a case in which there were three distinct growths, and Heaton (Path. Soc., London) and Bowlby (Brit. Med. Jour., 1894) have recorded cases in which the growth appeared in the form of a large number of small, disseminated tumors. In one of the author's

cases there were two tumors: one polypoid and protruding from the anus, the other submucous and involving about half of the circumference of the rectum.

The tumors vary in size from that of a hazelnut to a good-sized orange. Peterson has described one as 10 centimeters ($3\frac{1}{8}$ inches) long and 8 centimeters ($3\frac{1}{2}$ inches) wide, almost entirely occluding the lumen of the gut. In a patient of Dr. Ladinsky's, in which the tumor involved the sacrum and rectum, the rectal portion was as large as a coconut, and so filled up the gut that it was impossible to pass the finger beyond it. In the case from which Plate VI, Fig. 1, was made, the growth was very extensive, but did not protrude into the bowel to any great extent. The chief obstruction which it produced was at the anus.

Consistence.—To the touch, rectal sarcomas are comparatively hard, but have not the density felt in scirrhus cancer. In the spindle and round-cell varieties, this is not so marked as in the fibro-sarcoma and osteosarcoma, which are very hard and firm to the touch.

In the polypoid form they are elastic, with a firm center resembling very much the adenoid polyp.

Color.—To the eye, sarcomas of the rectum present various colors. Most frequently they appear like the normal mucous membrane; in other cases they are of a dark-red or grayish color, and when the melanosis is accentuated they appear as black gangrenous masses.

Where more than one tumor exists, they may differ materially in appearance, owing to the changes in the mucous membrane and to the fact that melanosis is rarely uniform in multiple growths.

As stated elsewhere, in a case reported by Ball, one of the tumors was black, while the other was pale and blanched. The first was infiltrated with melanin, while the latter exhibited no trace of it.

Site.—Sarcomas may occur at any portion of the rectum or sigmoid, but the large majority of them are situated low down near the anal margin. In all of the author's cases the growths were within the lower 2 inches of the gut, with the exception of the large one involving the sacrum, which was as much as $2\frac{1}{2}$ inches from the anus.

The growth may therefore be said to be one of the lower end of the rectum, and is very rarely found above the last 3 inches of the gut.

Course.—Sarcomas differ from other neoplasms of the rectum in the rapidity of their growth. They increase in size much more rapidly than do carcinomas, and their fatal termination occurs much sooner.

Differing from sarcomas in other portions of the body, those of the rectum are said to have a distinct tendency toward ganglionic infection (Gillette, *Union médicale*, 1874, p. 629, and Tuffier, *Arch. génl. de méd.*, 1888, p. 28). Early in the disease the lymphatic glands become enlarged. In those cases in which the tumor involves the margin of the

anus, the inguinal glands will be the first to become involved; in those situated higher up in the rectum, the sacral, mesenteric, and hypogastric chains will be the first attacked. Meunier (Bull. soc. d' anat., 1875, p. 792) reports a case in which there was a black, tar-like infiltration of the vertebral ganglia, and Tuffier (*op. cit.*) describes having found a pigmentary granulation in the blood in cases of melanotic sarcoma. This latter author, together with Gillette, insists upon the glandular involvement as a diagnostic symptom of the disease. Es-march, Grenet, and Tedenat deny this tendency to glandular involvement. In the author's cases it was present in 2 and absent in 3.

Metastasis is one of the chief characteristics of sarcoma of the rectum, and should always be borne in mind in considering any attempt at removal. The growth in the rectum may be a metastatic deposit itself, or, being primary, it may be associated with secondary developments in other organs, either of which conditions would contraindicate operation. This metastasis is sometimes very widespread, as in the case of Maier, where the lung, the pleura, the peritonæum, and the liver were involved; in that of Peterson, the liver, the intestine, the kidney, and pancreas; and in that of Hamonic, the gums and the skin.

In one of the author's cases, in which an autopsy was not permitted, small sarcomatous nodules occurred over the abdomen, and extended almost as high as the axilla; before death the patient became jaundiced, apparently indicating the involvement of the liver, and one nodule developed on the inferior maxilla. On the other hand, these cases occasionally go for considerable periods without any metastatic deposits.

Histology.—There are several different varieties of this growth known as round- or globe-cell, spindle- or fusiform-cell, giant-cell, alveolar, and mixed sarcomas.

The round-cell, spindle-cell, and alveolar sarcomas are the ones that occur most frequently in the rectum, although instances of the other types have been seen.

There is a general impression that the so-called melano-sarcoma represents a distinct variety of this neoplasm. As a matter of fact, any one of those enumerated may take on the melanotic change, which is due to the deposit of melanin in the tumor, giving it its color and name.

Sarcomas of the rectum, as elsewhere, consist of embryonic, connective-tissue cells embedded in an intercellular substance which varies in amount and character. They contain, as a rule, very little fibrous tissue, the mass being chiefly composed of embryonic cells. These cells are either uninucleated or multinucleated, and rarely possess a limiting membrane (Fig. 260).

The variety of the tumor is determined by the shape, size, and ar-

PLATE VI.



MELANO-SARCOMA



EPITHELIOMA OF ANUS AND VULVA

MALIGNANT NEOPLASMS



rangement of the cells. The consistence of the tumor depends upon the character of the cells, the intercellular substances, and the presence or absence of a fibrous stroma. Where there is an excess of fibrous elements, the tumor is spoken of as a fibro-sarcoma.

The blood-vessels are very numerous, and are usually in direct contact with the cells themselves or separated therefrom by a thin layer of fibrillary tissue. Their walls sometimes vary from the normal, being composed of densely packed embryonic cells, which, becoming detached, are carried along the channels, thus explaining the spread of sarcomata in the direction of the blood current.

When the tumor is of slow growth, an apparent capsule of thin, fibrous tissue may be formed around it. The round-, giant-, spindle-cell, and mixed forms of sarcoma are usually easily recognized by the microscope. The alveolar variety is, however, often confounded with carcinoma. It consists of a fibrous stroma resembling that of cancer, which

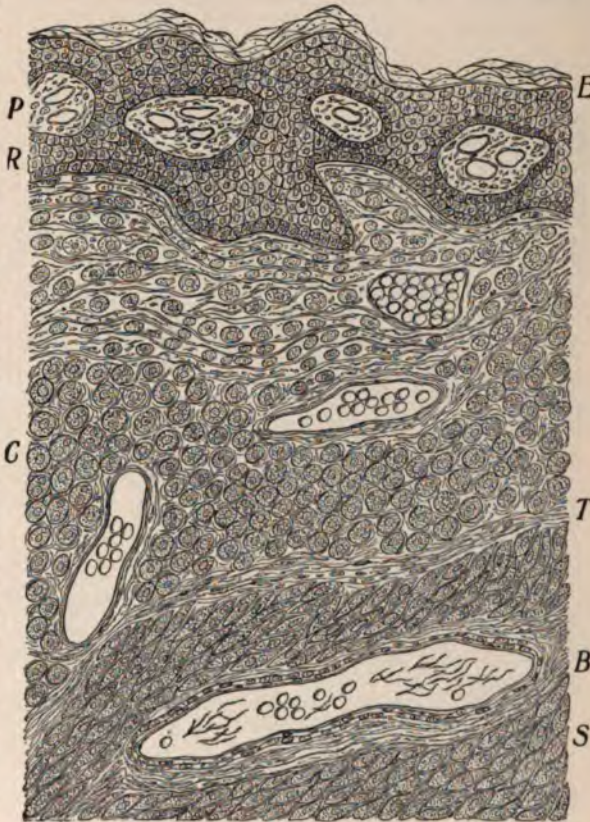


FIG. 260.—ROUND- AND SPINDLE-CELLED SARCOMA. (Magnified 400 diameters.)

E, epidermis; *P*, papillae, cut transversely; *R*, rete mucosum; *C*, round, nucleated sarcoma corpuscles; *S*, nucleated, spindle-shaped corpuscles; *B*, blood-vessel; *T*, connective tissue.

separates the sarcoma cells into groups. The cells are perfectly distinct from the fibrous network, and are loosely adherent; the blood-vessels follow the course of the fibrous tissue, and rarely if ever enter the cell groups (Fig. 261). The chief method of distinguishing it from carcinoma is by a close examination of the blood-vessels, the walls of which,

in sarcoma, are generally absent or very thin, while in the carcinoma we find them either normal or in the thickened state.

Melanosis does not alter the type of the tumor or change the character of its component parts. It may involve but one part of the tumor, while the other portions remain perfectly exempt. Where there are several tumors or nodules in the part, one may be thoroughly impregnated with the melanin, while the other remains perfectly free.

Occasionally hæmorrhages occur in these tumors owing to the thinness of the blood-vessel walls, which give them a dark appearance, and

may mislead one into supposing that they are melanotic.

Coplin claims that the hæmoglobin of such extravasated blood may cause the pigmentation; Ziegler, Stengel, and other authors do not consider this as possible, and account for the pigmentation in other ways.

Sarcomas of the intestine develop from the submucosa, and ordinarily do not affect the mucous membrane except by pressure, tension, and ulceration through traumatism and infection by the fæcal mass. In its earlier stages, and frequently after it has attained considerable size, the mu-

cous membrane covering it retains its normal characteristics, and may be easily moved about over the tumor.

Etiology.—The causes and influences which bring about the produc-



FIG. 261.—MELANOTIC ALVEOLAR SARCOMA.
(Magnified 400 diameters.)

PP, groups of pigmented corpuscles; *L*, pigment clusters;
FF, alveoli, containing round, spindle, and pear-shaped
corpuscles; *C*, capillary; *A*, artery; *T*, connective tissue.

PLATE VII.



PROCTOSCOPIC APPEARANCE AND SPECIMEN OF MEDULLARY CARCINOMA



tion of a sarcoma are as little known as those of carcinoma. Owing to the recent results in the serum therapy there seems to be some reason to believe that this neoplasm is the result of certain germs, to the life of which the antitoxins used by Coley are destructive, though Coley has not specialized any of these germs as causative influences. Inasmuch as sarcoma of the rectum originates ordinarily from the submucous tissue, it can hardly be said that it is the result of superficial irritation, as has been stated concerning cancer. What excites the hyperplasia and development of the embryonic tissue is yet to be determined.

Age and Sex.—Age can not be proved to have any direct influence, notwithstanding the fact that the majority of cases seen have been beyond the period of middle life. Nevertheless all are aware that sarcomas occur in children of very tender years.

Of 29 cases collected, 12 were females and 10 males, practically showing that sex has no etiological influence. The ages were given in only 22 cases. Of these, 4 were below forty, 5 between forty and fifty, 10 between fifty and sixty, and 3 above sixty years of age. From this one would conclude that the tumor was one rather of later years than middle life, as is held by the majority of writers.

The tumors may originate in the rectum, thus being primary, or they may occur here as a result of metastasis from tumors elsewhere in the body. Grenet (Thesis, Paris, 1887, No. 231) related the case of a young man who was operated on in August, 1880, for a small sarcoma of the gum, and died five months later in a state of cachexia, showing sarcomatous growths in the rectum and numerous other portions of the body. He also cited one in which, he says, the eye was first involved and later on the rectum. There is no positive proof in either of these cases, however, that the rectal condition was not primary, and that of the other organs secondary, the only evidence being that the first symptoms elicited were those of the gum in one case, and of the eye in the other. The practical absence of symptoms in the early stages of this disease in the rectum renders it impossible to decide this question.

Symptoms.—The symptoms of sarcoma of the rectum are at first very vague. A sense of fulness or feeling of the presence of a foreign body is sometimes described by patients as having existed for a long time before consulting the surgeon. Sometimes the first noticeable symptom is bleeding or discharge of mucus. Cases differ exceedingly with regard to hæmorrhages. In one case with a very large tumor there was no loss of blood; in another, in which there were two tumors, the woman had bled until she was almost exsanguinated and pulseless. The author operated with the patient in this weakened condition, and she succumbed to the shock. Perhaps it would have been wiser to

have packed the rectum and tried to control the hæmorrhage by styptics until her circulation could have been restored in a measure, but ineffectual efforts had been made in this line before she was brought to the clinic, and it seemed imperative that this hæmorrhage should be checked at once.

In the large melanotic sarcoma shown in Plate VI, there was some hæmorrhage in the first few weeks of the disease, but after that there was no loss of blood whatever. In the case of J. S., in which the sarcoma recurred at the site from which an adenoma had been removed, there were profuse hæmorrhages and a considerable discharge of pus. In the case of Mrs. P., there was a marked discharge of mucus tinged with blood, but never any hæmorrhage.

One would expect on account of the thin blood-vessel walls to meet with excessive hæmorrhages from sarcoma in the rectum, but as the growth is covered with normal mucous membrane, which remains intact until the later stages of the disease, the true sarcomatous tissue is not exposed to the friction and traumatism of the fæcal mass, and consequently the hæmorrhages are not very frequent, especially in the early stages.

The discharge of mucus is occasionally seen with these tumors, but it is not so marked as in epithelial tumors, because the hypertrophy is of the submucous tissue and does not involve the mucus-producing cells.

Protrusion.—Protrusion is more frequent in sarcoma than in carcinoma, but less so than in adenomata and villous tumors.

Where the growth assumes a polypoid shape and the pedicle is sufficiently long, it may come entirely outside of the anus. Even where it is sessile and situated just at the margin of the anus, eversion or prolapse of the lower end of the gut may cause the tumor to protrude.

Where the tumor is pedunculated and thus protrudes, severe hæmorrhages may occur on account of its being partially strangulated by the sphincter muscles.

Where the growth is of the melanotic variety, it may be mistaken for a gangrenous hæmorrhoid. On the other hand, even though melanotic in its center, the surface of the tumor may have a pale, yellowish-red color, resembling an epithelioma. Such was the case in one of the author's patients, in whom Dr. Jeffries and he both mistook the growth for an epithelioma.

Odor.—There is no odor peculiar to sarcoma. Before ulceration of its mucous surface takes place there is nothing more than the ordinary normal fæcal odor to the parts. After the ulceration has occurred, however, and there is a production of pus, it changes to that of decomposing tissue, but never assumes that peculiar characteristic and disgusting odor which one finds in carcinoma of the rectum.

PLATE VIII.



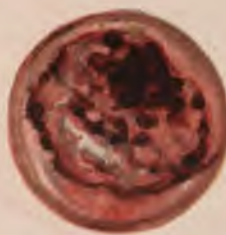
ULCERATIVE MEDULLARY CARCINOMA



EPITHELIOMA OF SIGMOID

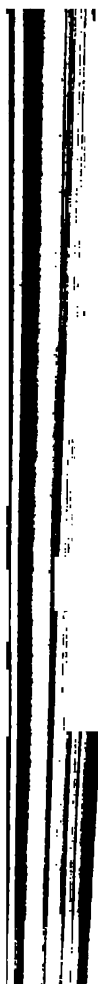


EPITHELIOMA
OF SIGMOID
(PROCTOSCOPIC)



EPITHELIOMA
WITH ULCERATION
(PROCTOSCOPIC)

MALIGNANT NEOPLASMS



Pain.—The amount of pain which a patient suffers with sarcoma depends very largely upon its site. If it is low down and involves the sphincter, thus inducing persistent contraction and pressure, the patient will suffer greatly, but if it is high up in the rectum and of an infiltrating form, he may go on almost to the very end without any knowledge of his grave condition. This symptom is therefore a very unreliable one.

The State of the Bowels.—The state of the bowels in sarcoma of the rectum also varies according to the type of the tumor; in some cases constipation is complained of persistently, whereas in others diarrhœa is almost uncontrollable.

In the large melanotic sarcoma, from which the plate was made, this woman restrained the movements of her bowels on account of the pain, and thus developed an inveterate constipation. In the case in which the sarcoma followed the removal of the adenoma, this patient suffered from a diarrhœa which one could not say positively came from the sarcoma, because the man had two adenomas higher up in the rectum which might have accounted for it.

General Symptoms.—Flatulence, indigestion, loss of appetite and weight are associated with sarcoma of the rectum, as they are with all other neoplasms of this organ.

Cachexia is not so marked as in carcinoma and villous tumor. The reflex digestive disturbances are quite as severe. Decrease in strength, loss of flesh, swelling of the feet and abdomen rapidly succeed one another when the sarcoma is once well developed.

Dysuria is frequently present, and complete suppression due to involvement of the kidney may occur. The lungs and pleura may become affected, presenting symptoms of acute pleuro-pneumonia, and the patient finally succumbs to progressive anæmia and exhaustion.

Diagnosis.—Sarcoma is to be distinguished from carcinoma, adenoma, fibroma, and villous tumor. It is more pedunculated than carcinoma, and less so than adenoma. It is more firm than the adenoma and less so than carcinoma.

In its attachment to the gut it does not involve so large an area, and it does not spread out, producing that wide infiltration of the walls like carcinoma. Its attachment is very abrupt, and one can generally limit the extent of the growth very positively and clearly.

To the touch it is more undulating and spherical than carcinoma, and the dendritic divisions which one finds in villous tumor and adenoma are absent. One may recall the fact that simple adenomas occur largely in children, whereas sarcoma is a disease of middle or advanced age; nevertheless, it is occasionally found in the young.



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When it is a question between sarcoma and multiple adenoma, the very multiplicity of the growths, the excessive diarrhœa, together with the comparatively fair condition of the patient's health, may be mentioned upon the side of adenoma. Between sarcoma and carcinoma the distinct odor of carcinoma is enough to make the decision positive.

In the early stages of sarcoma, the fact that the mucous membrane moves easily over the growth distinguishes it almost positively from carcinoma. The final test, however, depends upon the microscopic examination of a section of the growth. It will not do, however, to depend upon any superficial portion in order to make this diagnosis. The growth is a submucous one, and the section to be reliable must be taken from the substance of the tumor itself and not from the superficial mucous covering. It is inadvisable to make any incision into these growths for the purpose of obtaining a section, unless the case is an operable one and the patient consents to a removal, if the microscopic examination should show a necessity for the same.

Any mechanical irritation or interference with such growths only stimulates their progress and hastens the end, unless they are radically extirpated.

Treatment.—The treatment of these tumors consists in their radical removal. A ligature to pedunculated sarcomas ought never to be considered for one instant. The growth extends into the submucosa, and the ligature is sure to leave behind it portions of the disease. The tumor should be removed radically and widely at its base. If it is situated in the ampulla and limited in extent, posterior proctotomy may enable one to excise it thoroughly and bring the edges of the wound together; but if it is extensive and diffused, involving much of the circumference of the rectum, total excision or resection of the organ is the only recourse available. The technique of these operations will be described in the chapter on Extirpation.

While there seems to be some evidence in favor of the effectiveness of the serum therapy in sarcomas elsewhere, the advocates of this method give no encouragement in the treatment of this condition in the rectum. Recent experiments in the use of the X-ray in the treatment of sarcoma give some encouragement to hope that this line of treatment may prove successful in this disease. In the present state of our knowledge the author believes that it would be a wise precaution in inoperable cases, or even after the tumor has been removed, to apply the rays to the seat of the disease. If cautiously employed, no harm can result from it, and it is possible that recurrence may thus be prevented.

Prognosis.—The prognosis in sarcoma of the rectum is exceedingly

grave. Its tendency is toward a wide metastasis and rapid fatality. Very few of the cases survive more than one year after operation. Paul (Brit. Med. Jour., 1895, vol. i, p. 519) has reported a case living without recurrence one year, Bernays (Jour. Amer. Med. Ass'n, April 3, 1897) one five years, Ball (Brit. Med. Jour., 1895, p. 693) one nine years, and Esmarch (Deutsch. Chirurg., Bd. v, S. 516) one five years. The author reported a case to the Chicago Academy of Medicine in January, 1897, which is still free from recurrence five and a half years after operation, and in perfect health. The patient from whom the extensive melanoma shown in Plate VI was removed September 21, 1899, was living and well two years after the operation. The microscopical examinations of these cases were made by Drs. Heitzmann, Vissman, and Jeffries, and there can be no doubt as to the pathological nature of the growths. One was lympho-sarcoma, the other melanotic spindle-cell sarcoma. These cases, while few, show that extirpation of these growths is not utterly hopeless.

CHAPTER XX

EXTIRPATION OF THE RECTUM

THE operation of removing the rectum is now almost two centuries old. Faget performed it in 1739, but Lisfranc first successfully extirpated the rectum for cancer in 1826. The results of the operation in 9 cases were embodied in a thesis by one of his students (Pinault, Thesis, Paris, 1829, No. 167), and in 1833 the great surgeon himself gave to the world a complete account of his operation and method, thus establishing the procedure as a surgical measure (*Mémoires de l'académie royale de médecine*, 1833, t. ii, p. 296). The results in these cases were not calculated to create any great enthusiasm, for the mortality was high owing to the lack of aseptic technique; nevertheless, surgeons oscillated in their opinions between this operation and therapeutic measures for the next half century. As late as 1876 Sir Henry Smith said: "I should have thought this" (excision of cancer of rectum) "was entirely a part of the surgery of a bygone age, and that the recorded experience of those who had performed these operations in France and in this country would have sufficed to put an end to all such barbarism."

Up to this period the operation had been confined to growths low down in the rectum, and was performed either through perineal incision or through the anus itself. Verneuil, adopting the suggestion of Amussat, first practised the removal of the coccyx to obtain better access to the tumor, but the operation attained only slight popularity until Kraske's epoch-making paper before the fourteenth congress of German surgeons in Berlin in 1885. His suggestion to remove a portion of the sacrum, in order to reach neoplasms involving the upper portion of the rectum, revolutionized the surgery of these parts, and gave an impetus to the operation of extirpation which has probably carried us for a time beyond the limits of true conservatism. Soon after the announcement of Kraske, many surgeons, notably Hochenegg and Bardenheuer, advocated removing larger portions of the sacrum so as to widen the field of operation. This tendency reached its maximum in the method of Rose, which practically obliterated the entire bony floor

of the pelvis. In order to obviate this feature, Levy, Rehn, Rydygier, and Billroth proposed to make bone-flaps containing the coccyx and lower segments of the sacrum, which would be sutured back into position after the rectum was extirpated.

About this time Desguins first employed the vaginal route in extirpation of rectal cancer (*Annales de la soc. de méd., D'Anvers*, September, 1890). Price (*Med. and Surg. Reporter*, May 16, 1896) and Arthur (*Amer. Jour. of Obstet.*, 1881, vol. xxiv, p. 567) had previously made use of the vagina as a point for the implantation of the gut after extirpation of the rectum where it was impossible to bring it down and suture it to the margin of the anus, but neither of them suggested attacking the growth through this canal.

Later on in 1894 and 1896, Giordano and Quénu (*Clinica Chirurg., Milano*, 1896, f. 463; *Chirurgie du rect.*, t. ii, p. 290) found it difficult to control hæmorrhage and dissect out the enlarged ganglions above the sacral prominence by the foregoing methods, and advocated opening the abdomen, loosening the attachments of the upper rectum and sigmoid, and the establishment of an artificial anus; after this the rectum was dissected out from below either through the perineal or sacral route. These efforts created what is known as the combined method for extirpation of the rectum. They were preceded, however, in this method by Maunsell, who advised in 1892 a laparotomy to loosen the upper rectum and sigmoid from their attachments to the sacrum, the invagination of the growth through the anus, and resection of the neoplasm thus brought outside of the body. Recently extirpation through the abdominal route alone has been advocated by Mann and Edebohls.

From this brief sketch it will be seen that there are five general methods of accomplishing extirpation—the *perineal*, the *sacral*, the *vaginal*, the *abdominal*, and the *combined*.

Preparation of the Patient.—Before describing these methods in detail it may be well to consider the preparation of the patient, which is practically the same in each. In order to obtain the best results it is necessary to increase the patient's strength as far as possible by forced feeding for a time, to empty the intestinal tract of all hard and putrefying fæcal masses, to establish as far as we may intestinal antiseptics, and to check in a measure the purulent secretion from the growth.

It requires from seven to ten days, or longer, to properly prepare a patient for this operation. The diet best calculated to obtain a proper condition of the intestinal tract is generally conceded to be a nitrogenous one. The absolute milk diet is not so satisfactory as a mixed diet composed of meat, strong broths, milk, and a small quantity of bread and refined cereals. The patient should be fed at frequent intervals, and as much as he can digest. Along with this forced feeding one should

administer daily a saline laxative which will produce two or three thin movements, and to disinfect the intestinal canal one should give through the stomach three or four times a day either sulphocarbolate of zinc, grs. ijss. in the form of an enteric pill; naphthalene, grs. xv in a capsule; beta-naphthol, grs. x, or salol, grs. x, in the same manner. The rectum should be irrigated three times a day with solutions of bichloride of mercury 1 to 5,000, permanganate of potash 1 to 1,500, or, as has been recommended by Quénu (*Soc. de chir.*, February 23, 1898), peroxide of hydrogen. This solution is made by mixing one part of the peroxide of commerce with three to four parts of boiling water. Quénu states that it causes no irritation in the mucous membrane, that it deodorizes the cancer in a few hours, that its action is persistent, and that it destroys the micro-organisms more effectually than any other substance.

On the day previous to the operation the perinæum, sacral region, and pubis should be shaved, dressed with a soap poultice for two hours, then washed and dressed with a bichloride dressing, which should be retained until the patient has been anæsthetized. Notwithstanding all these preparations it is impossible to obtain absolute asepsis of the affected area, and so many fatalities occur from infection, either during the operation or through the giving way of the sutures and pouring out of the intestinal contents into the wound, that it is deemed wise by many surgeons to make an artificial inguinal anus as a preliminary procedure in all extirpations of the rectum. Schede (*Deutsch. med. Woch.*, Leipzig, 1887, S. 1048) first took this precaution, making the colotomy at the same time that he extirpated the rectum, thus diverting the faecal current from the operative field and reducing the chances of sepsis from this source. This method has been largely adopted by surgeons all over the world; some make a permanent inguinal anus to begin with, closing up the distal end of the sigmoid and dropping it back into the intestinal cavity, where it is either left or removed along with the cancer (Keen, *Jour. Am. Med. Assoc.*, 1898); others make a temporary inguinal anus, which is closed later on if it is found feasible to restore the faecal exit to its normal position at the anus. Some advise making this anus in the sigmoid, others in the transverse colon, and still others in the ascending colon just above the cæcum. The wisdom of this precaution can not be questioned in very many cases, but its necessity is open to debate. It involves either a threefold operation or the establishment of a permanent inguinal anus, both of which are to be avoided if possible; and if it is made in the sigmoid it may prevent the gut being brought down sufficiently to reestablish the intestinal canal. The question therefore arises, When is this procedure necessary? It appears to the author that where the cancer is low down and the caliber of the gut is sufficiently great to enable one to thoroughly empty the intestinal canal of all faecal

accumulations above it, where it is perfectly clear before beginning the operation that one will be able to bring the gut down from above and suture it to the margin of the anus, this procedure is not indicated. When there is any doubt with regard to the possibility of accomplishing this latter operation, the preliminary artificial anus ought always to be made. The author is opposed, however, to making a permanent colostomy except in those cases where the extent of the growth renders it certain that the normal faecal tract can not be restored. A preliminary artificial anus that may be readily closed can be easily made if, after manual examination of the pelvic cavity, one is persuaded that he can extirpate the cancer and restore the intestinal tract. In the chapter on Colostomy the manner of accomplishing this is thoroughly explained. If after extirpation it is found that the intestinal tract has not been restored, it is always possible to convert the temporary into a permanent artificial anus with comparatively no danger to the patient. In the 32 cases operated upon by the author, artificial ani have been made in 10 cases. Of these, 3 resulted fatally, thus giving a slightly higher mortality than that obtained in operations without preliminary colostomy. It is not meant by this to claim for one instant that the artificial anus increases the mortality from extirpation. The author firmly believes that if it were consistently employed in every extirpation of the rectum, the mortality from this operation might be slightly reduced; but he also holds that in the class of cases mentioned above the two additional operations can be avoided with comparative safety. Where the artificial anus is employed, one should not be in too great haste to carry out the extirpation. A period of ten days or two weeks should be allowed to elapse between the two operations. During this time the rectum should be irrigated through the lower end of the artificial anus and through the anus with antiseptic solutions, and at the same time one may take advantage of this period to employ forced feeding, tonics, and stimulating remedies to improve the patient's general condition and better prepare him to withstand the shock of operation.

It has been suggested by E. H. Taylor (*Ann. of Surg.*, 1897, vol. i, p. 385), that where the cancer is soft and ulcerated, one may employ curettage to remove the sloughing and suppurating portions of the growth, following this for a few days by frequent irrigations, and then carrying out an extirpation by whatever method is deemed best. This procedure has not been generally adopted by surgeons, and possesses no advantages over the preliminary artificial anus.

PERINEAL METHOD.—Under this method may be included certain operations for small epitheliomas low down in the rectum done through the anus. The procedure is carried out as follows:

The patient having been properly prepared, the sphincter is thor-

oughly dilated; a circular incision through the entire wall of the gut is made half an inch below the neoplasm; this incision may entirely surround the rectum, or it may be limited to half the circumference when the growth is confined to one side; the upper segment of the gut is then caught with traction forceps and dragged upon by an assistant while the operator frees it by scissors and blunt dissection to a point at least half an inch above the cancer; it is then cut transversely well above the growth, the upper segment being caught by forceps to prevent retraction; finally, this end is brought down and sutured to the lower edges of the original incision (Ledru, *Cong. Franc. d. chirurg.*, 1891, p. 319; Hartmann, *ibid.*, 1893, p. 698; Routier, *Exérèse dans le cancer du rectum*; Finet, p. 204). The cases to which this method is applicable are very rare; moreover, the procedure is open to the objections that it is very likely to be followed by septic infection, and furnishes no opportunity to remove any affected glands.

Numerous methods have been devised by various surgeons for extirpation of the rectum by the perineal route proper. The old operations of Lisfranc, Dieffenbach, Velpeau, and Verneuil are no longer employed. The V-shaped incision of Schelky (*Berlin. klin. Woch.*, 1892, No. 32), the lateral incision of Hartmann through the ischiatic fossa (Quénu and Hartmann, *op. cit.*, t. ii, p. 249), and the H-shaped incision of Depage (*Ann. d. l. soc. Belge d. chir.*, 1893, No. 6), are all to be rejected on account of the vast areas of tissue laid open and the unsatisfactory access to the rectum which they give.

The methods of Cripps and Allingham have long been very popular in extirpation of cancers in the lower portion of the rectum.

Cripps's Method.—A long, sharp-pointed, curved bistoury is introduced through the anus and made to penetrate from within outward at the tip of the coccyx; all of the intervening tissues are then cut through, thus laying the rectum open up to this point; lateral incisions are then made around each side of the rectum, either through the skin outside of the sphincter or through the mucous membrane above the muscle, according to whether the anus is involved in the neoplasm or not; these incisions should be made deep and boldly at one sweep, the wounds being immediately packed with gauze to control hæmorrhage; after this the rectum is freed from its lateral and posterior attachments by scissors and dull dissection to a point well above the cancer; these parts of the wound are then packed with gauze and the rectum is dissected off anteriorly from the perinæum, urethra, and prostate; this step is somewhat difficult, and a good-sized sound should be kept in the urethra during the procedure in order to avoid wounding this organ. If the growth is limited to one side of the rectum, only this portion is dissected out. After the dissection is completed the gut is amputated

above the growth by a wire *écraseur* or a galvano-cautery loop. Unless the growth is very low, no attempt is made to bring the gut down and suture it to the anus, but a drainage-tube is introduced into the upper segment, and after the hæmorrhage is controlled the wound is packed with sterilized gauze. The gap between the anus and excised gut is left to heal by granulation.

Allingham's Method.—The chief feature of this procedure consists in a deep dorsal incision; with the left index finger in the rectum, a long, narrow bistoury is introduced through the skin just posterior to the anus and carried through the post-rectal tissues above the upper limits of the growth entirely outside of the rectum; the tissues between this and the sacrum and coccyx are incised from this point downward at one stroke; the wound is packed with sponges to control the bleeding; an incision is then made all around the rectum (Fig. 262) and between the two sphincters if the anus is not in-



FIG. 262.—LINE OF INCISION IN PERINEAL PROCTECTOMY BY ALLINGHAM'S METHOD.

involved, and the external muscle is incised at the posterior commissure; the muscle is thus left in the skin-flaps; with the finger in the rectum one blade of a long scissors is introduced into the posterior wound, the other is thrust into the ischio-rectal fossa, and the intervening cellular tissues cut through. Each side is treated in the same manner, and the wounds packed with sponges. The outer edges of the wounds being held apart by broad, flat retractors (Fig. 263), the surgeon then proceeds to dissect the anterior portion of the rectum loose from its attachments. A sound should be held in the urethra in men and an assistant's finger in the vagina in women to prevent wounding these organs. After the gut has been dissected out well above the tumor, it is caught by rectangular clamps and cut off below these. Bleeding is controlled by ligatures and equal parts of hot water and alcohol. Allingham states (*op. cit.*, p. 358): "In most of our cases it was absolutely impossible to bring down the stump of the rectum to the skin; if, indeed, these parts could be brought together, the tension would be so great that the sutures would be torn out in a few

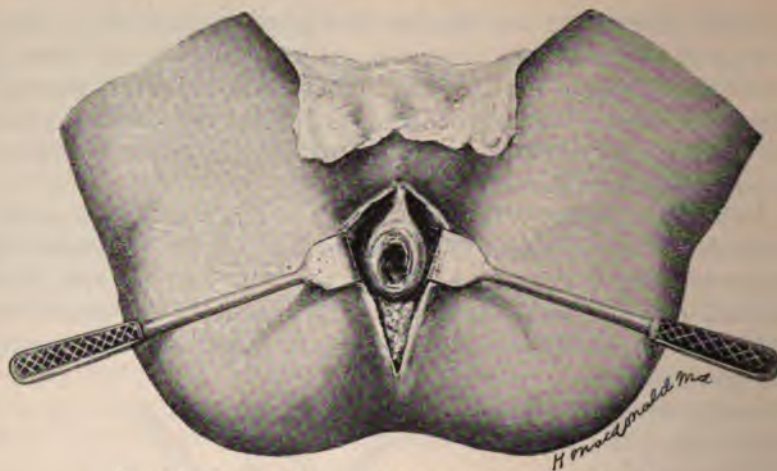


FIG. 263.—SECOND STEP IN ALLINGHAM'S METHOD (Mathews).

hours." The rapidity with which this operation can be done and the preservation of the external sphincter comprise its chief advantages.

These operations are open to the same objections: they do not remove the affected ganglions, they leave a section of the rectum to be repro-



FIG. 264.—PERINEAL EXTIRPATION OF THE RECTUM (Quénu's method).

R, rectum; E, external sphincter; C, coccyx; T, transversus perinei muscles; A, bulbous urethra.

duced by granulation, and they inevitably lead to infection and prolonged suppuration. For this reason the writer no longer practises them.

Recognizing the facts that the mortality from extirpation of the rectum by the perineal route is much lower than by any other method, and that the deaths are largely due to sepsis following the operation, surgeons have long sought to devise for this measure some efficient antiseptic technique. Infection occurs during the operation from introducing the finger into the rectum and then into the wound, or from cutting or tearing the rectal wall so that its contents flow out into the



FIG. 265.—PERINEAL EXTIRPATION—LOOSENING RECTUM FROM ANTERIOR PERINEAL RHAPHE.
L, levator ani; R, rectum; M, raphe.

operative field; after the operation it occurs from the passage of fæces over the fresh wound. In order to avoid the latter, a preliminary artificial anus may be employed. To avoid the former, one must absolutely close the lower end of the rectum and keep well away from the wall of the gut in his dissections. These ends are largely accomplished by the technique of Quénu (*Rev. de gynéc.*, September and October, 1898). With some slight modifications introduced by the writer, this proceeding is as follows:

The patient, after being properly prepared, is anæsthetized and placed in the lithotomy position, the hips being well elevated above the

shoulders by cushions or inclination of the table; the rectum is then irrigated, dried out, and loosely packed with gauze in order that one may recognize a close approach to its walls during dissection; a circular incision is then made through the skin around the anus, and this is dis-



FIG. 266.—PERINEAL EXTIRPATION.

R, rectum; *L*, levator ani; *G*, neoplasm; *P*, peritoneal pouch; *S*, seminal vesicles and prostate.

sected up inside of the sphincter to the extent of about $\frac{1}{2}$ an inch. Around the cylinder thus dissected loose a strong silk suture is tied, the ends of which are left long for purposes of traction (Fig. 264); the extremity of the anus below the ligature is then cauterized with a Paquelin blade to destroy any infectious germs which it may contain. The external sphincter is then incised anteriorly and posteriorly entirely outside of the rectum, the posterior incision being carried back to the tip of the coccyx and well into the retro-rectal space; the rectum is then dissected from its attachments laterally and posteriorly, the sphincter being left in the skin-flaps, if it is not involved in the growth; in doing this the levator ani muscle should be cut off as close to the rectum as possible (Fig. 265). The skin and sphincter muscle having been incised in the median line anteriorly as far as the junction with the scrotum, the rectum is drawn backward and dissected loose anteriorly up to the level of the levator ani, which is much higher here than posteriorly. The finger is then introduced from behind forward

above the anterior fibers of the levator and the deep perineal fascia, and by gently dragging downward these are separated from the rectum in the lines of cleavage; when this has been accomplished on both sides, the anterior attachment of the levator and ano-bulbar rhapshe to the rectum are cut through upon the finger, and the organ is thus freed in its entire circumference. This accomplished, the operator reaches the superior pelvi-rectal spaces filled with cellular tissue, from which the rectum can be separated by the finger until the peritoneal *cul-de-sac* is reached in front (Fig. 266). At this point the lateral connective-tissue folds which support the rectum on the sides must be clipped with scissors, and then the gut will descend well outside of the wound. Sometimes the peritonæum can be stripped off from the rectum and its cavity need not be opened; it is better, however, to open the cavity at once when the growth extends above this point. Before doing this it is well to disarticulate the coccyx and fold it backward in order to obtain more room, and separate the rectum from the sacrum by break-



FIG. 267.—PERINEAL EXTIRPATION—THE PERITONEAL POUCH LAID OPEN.

ing up the cellular and fibrous attachments with the fingers. The peritonæum is then incised (Fig. 267), cut loose from its attachments close to the rectum back to the mesorectum (Fig. 268), which should be cut close to the sacrum in order to avoid wounding the inferior mesenteric artery. When the gut has been loosened sufficiently above the tumor

to be brought down and sutured to the anus, one should proceed to close the peritonæum and restore the planes of the pelvic floor down to the levator ani by fine catgut sutures. After this has been accomplished the anus, which is now well outside of the operative field, should be reopened,

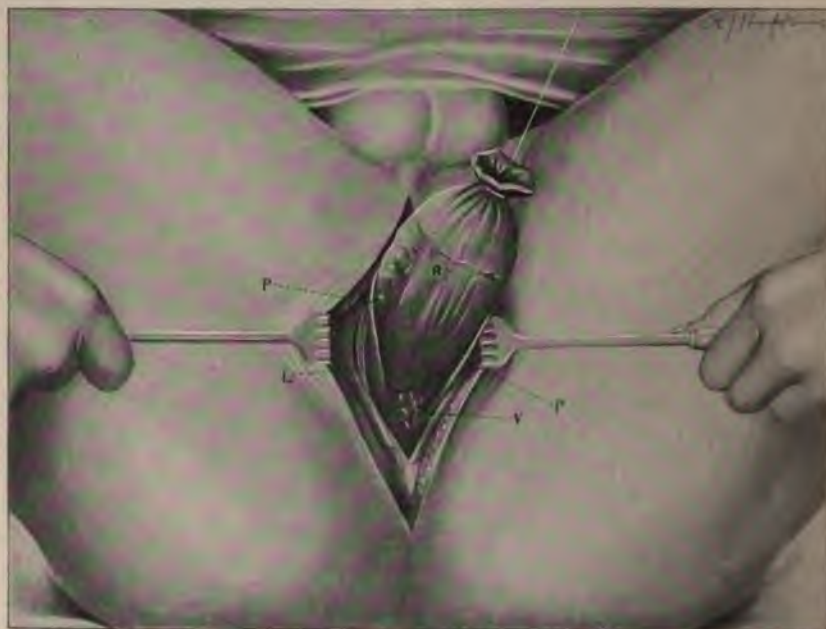


FIG. 268.—PERINEAL EXTIRPATION.

P, lateral peritoneal folds; *V*, glandular enlargement between folds of mesorectum.

the gauze should be removed, and the gut flushed with a solution of bichloride of mercury or peroxide of hydrogen. It is then amputated through healthy tissue above the tumor, and its upper end sutured at the original site of the anus. Quénu advises that in amputating, each layer should be cut separately in order to avoid hæmorrhage, but there appears to be no advantage in this; in fact, we are much more likely to meet with deficient blood supply, causing subsequent sloughing of the gut, than with hæmorrhage. The posterior and anterior portions of the perineal wound are packed with gauze and left open to assure drainage (Fig. 269), and the parts are covered with aseptic pads held in position by a well-fitting diaper or broad T-bandage. A large drainage-tube is passed well up into the rectum, its lower end extending outside of the dressings in order to convey the discharges and gases beyond the operative wound. This procedure is applicable in the female, but it is somewhat difficult to avoid wounding the vagina, and there is always danger of infection from this organ during and after the operation. It

does not appear to possess any advantages in women over the vaginal route.

In incising the peritonæum, it is the author's practice to begin at the lowest portion of the anterior *cul-de-sac* and cut close to the intestine up to the mesorectum. From this point upward he incises the peritoneal fold as close to the sacrum as possible; first, because it avoids the danger of wounding the superior hæmorrhoidal artery, and, second, because it removes along with the growth all glandular enlargements in the mesorectum. As can be well understood, the operation is not applicable to those cases in which the tumor is isolated well above the rectum, and can be resected, leaving a healthy area of 2 inches or more between the anus and the growth. In other words, where resection is feasible, the perineal route is not to be advised; where amputa-



FIG. 269.—PERINEAL EXTIRPATION COMPLETED.

U, tampon and drainage-tube in anus.

tion is necessary, this route should be employed. The author has successfully removed 5 inches of the gut by this method.

SACRAL METHOD: KRASKE'S OPERATION.—These terms are applied to various operations in which access to the rectum is obtained by removing the coccyx or cutting off certain portions of the lower end of the sacrum. They are all modifications of Kraske's original method. In some the coccyx and parts of the sacrum are removed altogether, in

others they are left in the flap, and restored to their normal position after the operation is completed.

Kraske removed the coccyx and left lower angle of the sacrum (Fig. 270); Hochenegg the lower end of the bone by an oblique section extending from the third sacral foramen on the left to the notch below the fourth foramen on the right (Fig. 271); Bardenheuer cut the bone squarely across just below the third sacral foramina, and removed all that portion below this level (Fig. 272); Rose went higher and removed all below the second foramina (Fig. 273). Kraske, recognizing that sufficient space was not always furnished by his original method, revised it (Berlin. klin. Woch., 1888, No. 48), and laid down the guiding principles in all these operations by stating that only so much of the sacrum should be removed as is necessary to reach all the disease, and in many cases excision of the coccyx alone will accomplish this. Senn (Surgical Technique, Esmarch and Kowalzig, Amer. edit., 1901, p. 821) limits himself to this excision.

Heinecke, recognizing the disadvantages of removing any of the bony floor of the pelvis, first proposed osteoplastic resection of the coccyx and sacrum (Münch. med. Woch., 1888, Bd. xxxvii). He made a median incision from the posterior border of the anus to the fourth sacral foramen, divided the coccyx and sacrum longitudinally with a saw, and then chiseled the sacrum off transversely below the foramina in order to preserve the fourth sacral nerves; he then turned the flaps of bone and soft tissues aside and thus exposed the rectum (Fig. 274); Gussenbauer followed the same plan, but made the transverse cut just below the second sacral foramina. Levy (Centralbl. f. Chir., 1889, No. 13) made a rectangular flap, including the bone and soft tissues below the level of the fourth sacral foramen, and dragged the flap downward (Fig. 275). Finally, Rehn (Deutsch. Cong. f. Chir., 1890) and Rydygier (Centralbl. f. Chir., 1893, No. 1) proposed the following method: An oblique incision is made through the soft parts on the left side of the sacrum from the posterior superior spine of the ilium to the tip of the coccyx, and thence in a median line to the margin of the anus; a transverse incision is then made at the level of the third sacral foramen, and the bone chiseled off transversely at this point; the bone and tissue flap thus formed is now drawn aside, exposing the posterior surface of the rectum (Fig. 276), and extirpation is then carried out.

The author adopts a modification of this plan in preference to all other sacral methods for the following reasons: It furnishes a rapid and adequate approach to the rectum; it facilitates the control of hæmorrhage; it restores the bony floor of the pelvis and attachment of the anal muscles; it involves injury of the sacral nerves and lateral sacral arteries on one side only.

The technique which he employs is as follows: The patient is previously prepared as heretofore described, and an artificial anus established or not as the conditions indicate; before the final scrub-



Fig. 270.—Kraske's.



Fig. 271.—Hochenegg's.



Fig. 272.—Bardenheuer's.



Fig. 273.—Rose's.



Fig. 274.—Von Heinecke's.



Fig. 275.—Levy's.



Fig. 276.—Rydygier's.



Fig. 277.—Hegar's.

FIGS. 270-277.—METHODS OF SACRAL RESECTION IN EXTIRPATION OF THE RECTUM.

bing, the sphincter should be dilated and the rectum irrigated with bichloride solution (1 to 2,000) or peroxide of hydrogen; it should then be packed with absorbent gauze so that the finger can not be intro-

duced into it; the patient is then placed in the prone position on the *left* side, with the hips elevated on a hard pillow or sand-bag; after the operative field has been thoroughly cleansed an oblique incision is made from the level of the third foramen on the *right* side of the sacrum down to the tip of the coccyx, and extended half-way between this point and the posterior margin of the anus. This incision should be made boldly with one stroke through the skin muscles and ligaments into the cellular tissue posterior to the rectum; the latter is rapidly separated by the fingers from the sacrum, and the space thus formed, together with the wound, should be firmly packed with sterilized gauze (Fig. 278);



FIG. 278.—EXTIRPATION OF THE RECTUM BY THE SACRAL ROUTE—FIRST STEP IN THE BONE-FLAP OPERATION.

a transverse incision down to the bone is then made at the level of the fourth sacral foramen, the bone is rapidly chiseled off in this line, and the triangular flap is pulled down to the left side, where it is held by the weight of a heavy retractor attached to it. At this point it is usually necessary to catch and tie the right lateral and middle sacral arteries. Frequently these are the only vessels that need be tied during the entire operation of resection, although, if one cuts too far away from the sacrum, the right sciatic artery may be severed. The relations of the parts thus exposed are well shown in the cut (Fig. 279), made from a very old picture lent to the author by Dr. A. T. Cabot, of Boston.

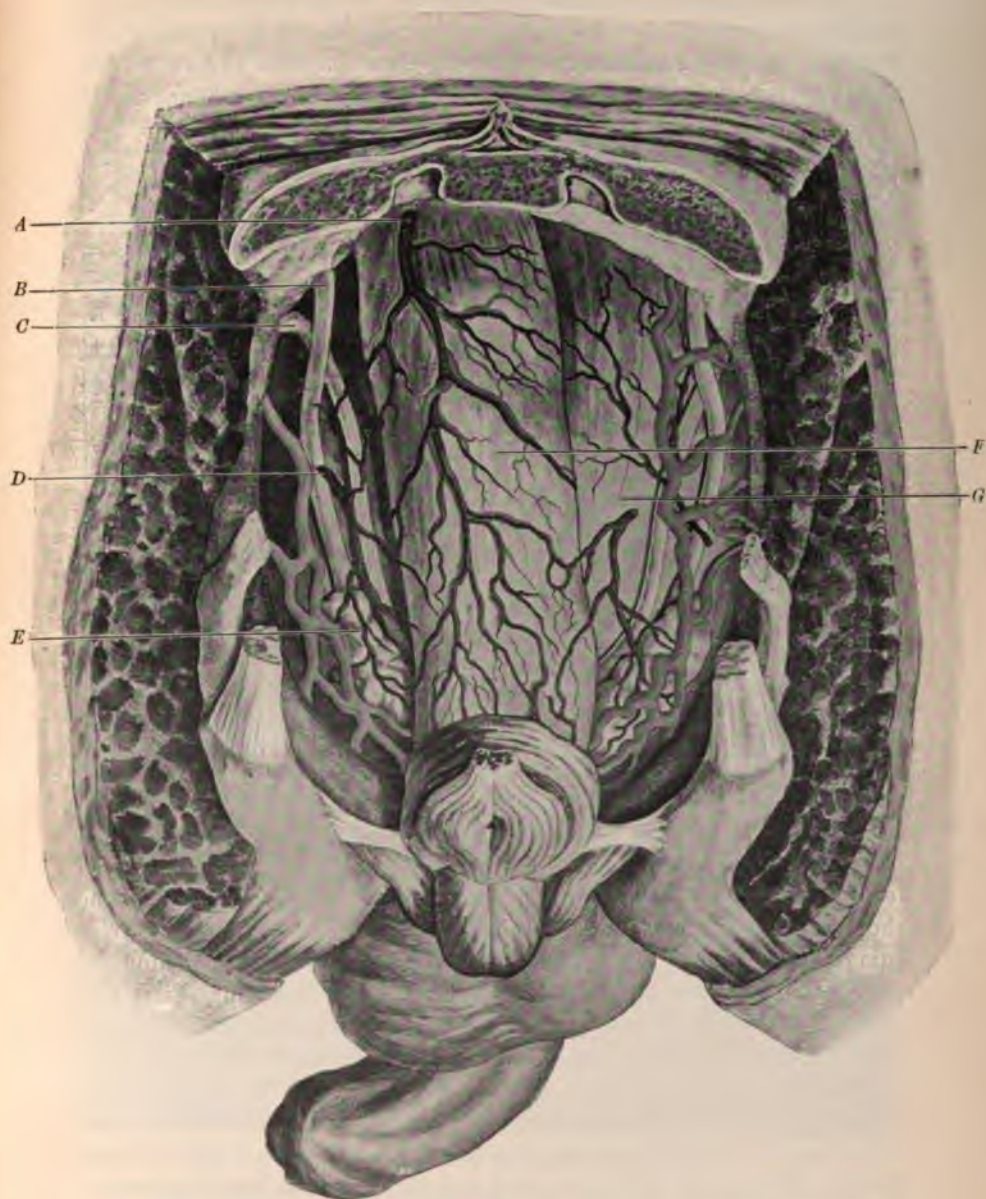


FIG. 279.—SACRUM REMOVED TO EXPOSE RECTUM AND OTHER PELVIC ORGANS (partly schematic).

A, superior hæmorrhoidal artery; *B*, vas deferens; *C*, ureter; *D*, lateral sacral artery;
E, seminal vesicles; *F*, rectum; *G*, bladder. (Cabot.)

The first step in the actual extirpation of the rectum consists in isolating the organ below the level of the resected sacrum so that a ligature can be thrown around it, or a long clamp applied to control any bleeding from its walls (Fig. 280). If the neoplasm extends above this

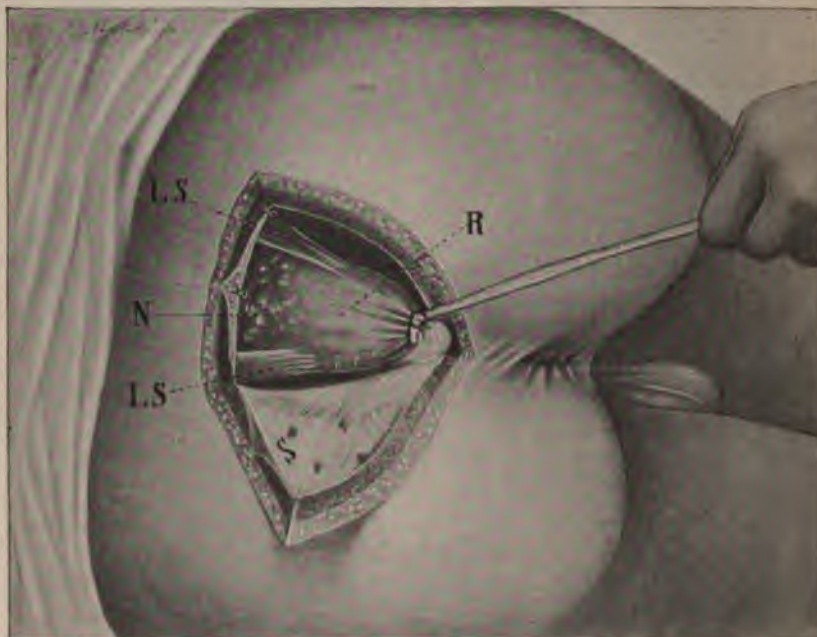


FIG. 280.—SECOND STEP IN BONE-FLAP OPERATION.

R, rectum; *N*, neoplasm; *L.S.*, lateral rectal ligaments; *S*, sacrum.

level and it is necessary to open the peritoneal cavity to extirpate it, one should do this at once, as it will be found much easier to dissect the rectum out by following the course of the peritoneal folds. By opening the peritonæum and incising its lateral folds close to the rectum (Fig. 281), the danger of wounding the ureters is greatly decreased and the gut is much more easily dragged down. When the posterior peritoneal folds or mesorectum is reached, the incision should be carried as far away from the rectum, or rather as close to the sacrum, as possible in order to avoid wounding the superior hæmorrhoidal artery, and to remove all the sacral glands. The gut should be loosened and dragged down until its healthy portion easily reaches the anus or the healthy segment below the growth (Fig. 282). A rubber ligature or strong clamp should then be placed upon the intestine about 1 inch above the neoplasm, but should never be placed in the area involved by it, for in so doing the friable walls may rupture and the contents of the intestine be poured out into the wound. As

soon as the gut has been sufficiently liberated and dragged down, the peritoneal cavity should be cleansed by wiping with dry sterilized gauze, and then closed by sutures which attach the membrane to the gut (Fig. 282, *P*). By this procedure the entire intraperitoneal part of the operation is completed and this cavity closed before the intestine is incised. After this is done the gut should be cut across between two clamps or ligatures above the tumor, the ends being cauterized with carbolic acid, and covered with rubber protective tissue. The lower segment containing the neoplasm may then be dissected from above downward in an almost bloodless manner until the lowest portion is reached. It is much more easily removed in this direction than from below upward, and there is less danger of wounding the other pelvic organs. If the neoplasm extends within 1 inch of the anus it will be necessary to remove the entire lower portion of the rectum. If, however, more than 1 inch of perfectly healthy tissue remains below, this should always be pre-

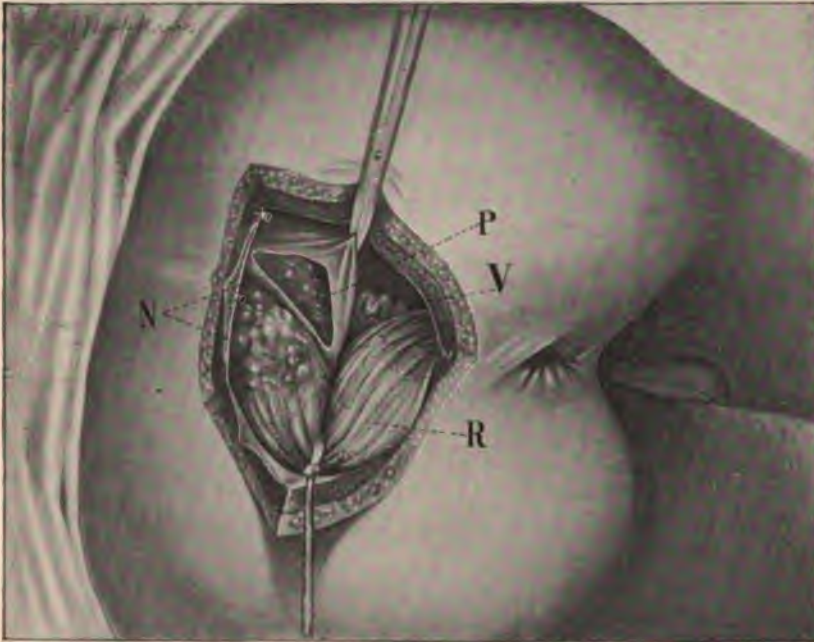


FIG. 281.—THIRD STEP IN BONE-FLAP OPERATION.

P, opening in the peritoneum; *V*, seminal vesicle and bladder; *N*, neoplasm; *R*, rectum.

served. Having removed all of the neoplasm, if 1 inch or more of healthy gut remains above the anus, one should unite the proximal and distal ends of the gut either by the Murphy button or end-to-end suture (Fig. 283). The author has applied both methods about an equal

number of times. He is of the opinion that through-and-through suture of the intestine is quite as satisfactory as any other method. Posterior

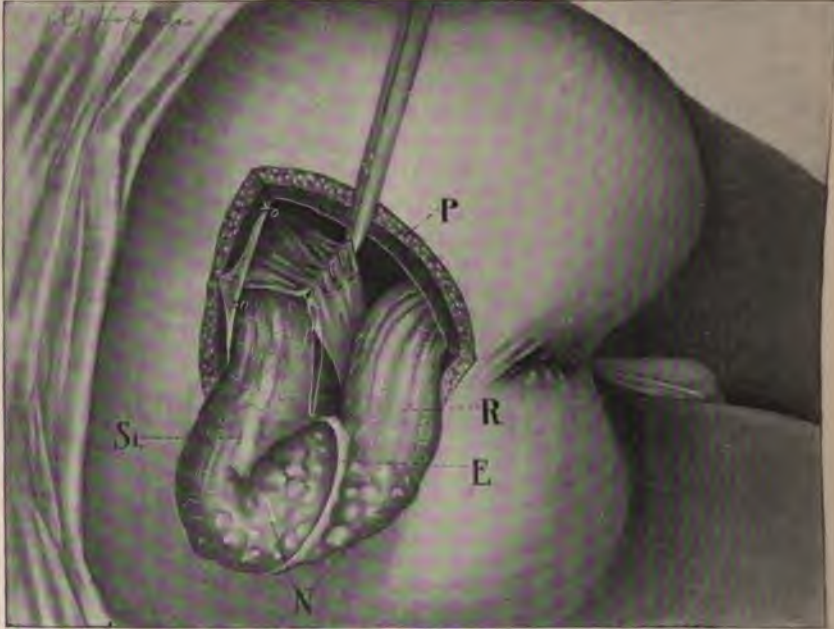


FIG. 282.—FOURTH STEP IN BONE-FLAP OPERATION.

R, rectum; *Si*, sigmoid; *E*, site of recto-vesical *cul-de-sac*; *P*, peritoneal cavity closed.

fistula follows in almost every case, but it generally heals spontaneously, and need give no serious concern.

Where there is less than 1 inch of the rectum left below, and the gut can be easily brought down to the anus, it is well to dissect off the mucous membrane from the latter organ, invaginate the upper end of the intestine through this, and suture it to the skin outside. The gut is not sutured to the margin of the anus, but entirely outside of it, in order that the faecal passages will not come in contact with the line of union between the freshened portion of the anus and the peritoneal surface of the gut which has been dragged down. No tension should be employed in bringing the gut down to position. After it has been fixed in place, a large silk anchoring suture is placed in the mesorectum about 3 inches above the anus and attached to the skin outside the lower angle of the wound, in order to prevent retraction of the gut and tension on the sutures. In some instances in which, contrary to expectations before the operation, we are unable to reunite the ends of the intestine or to bring the proximal end down to the anus, it is necessary to attach the latter at a higher level in the wound, thus

forming what is known as a sacral anus (Fig. 284). All oozing is checked by hot compresses, and the concavity of the sacrum is packed with a large mass of sterilized gauze, the end of which protrudes from the lower angle of the wound; this serves to check any oozing and also furnishes a support to the bone-flap after it has been restored to position. Finally, the flap is fastened back in its original position by silkworm-gut sutures, which pass deeply through the skin and periosteum on each side of the transverse incision. Suturing the bone itself is not necessary. The lateral portion of the wound is closed by similar sutures down to the level of the sacro-coccygeal articulation; below this it is left open for drainage (Fig. 285). A large drainage-tube is carried up through the gut beyond the line of intestinal sutures, and the whole is dressed with sterilized absorbent gauze held in position by adhesive straps and a firm T-bandage. The patient is placed in bed, lying upon the back or right side, and the head of the bed is slightly elevated in order to prevent any concealed hæmorrhage escaping upward into the peritoneal cavity. It is important

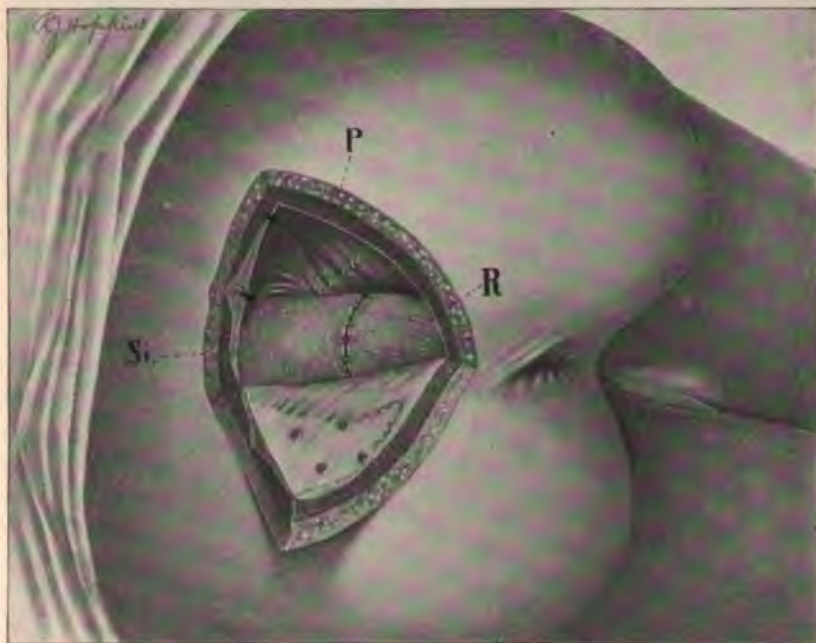


FIG. 283.—FIFTH STEP IN BONE-FLAP OPERATION.

The growth has been resected and the ends of the intestine have been sutured together.

that the surgeon should know exactly how much oozing is taking place from the wound; the decrease in oozing accomplished by raising the foot of the bed does not compensate for the dangers of concealed bleeding.

Usually there is considerable oozing for the first twenty-four hours following the operation, during which time the outside dressings should be replaced by fresh ones several times, the inner dressing being left *in situ* for seventy-two hours. After this they are removed, and either drainage-tubes or small gauze strips introduced into the hollow of the sacrum. The patient is encouraged to get upon his feet as soon as possible in order that the parts may drain more easily, and that the weight of the abdominal contents will press the pelvic floor backward in contact with the sacrum, and thus hasten the filling in of this cavity.

The patient is kept upon concentrated liquid diet, and if a preliminary artificial anus has not been employed his bowels should be confined by opium for the first ten days, after which they are moved by enemata of oil and glycerin.

This technique has now been employed for six years; it differs from that of Rehn and Rydygier in the following points: First, the incision is

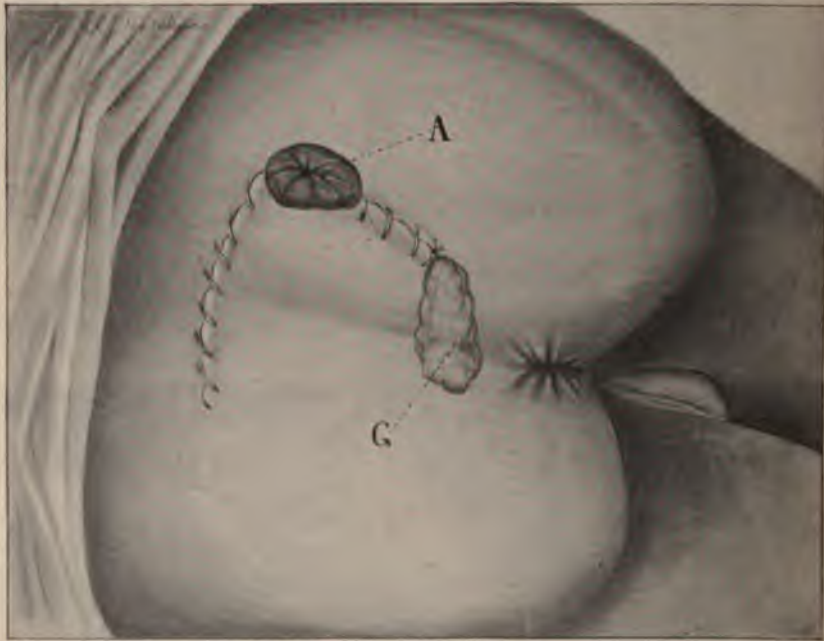


FIG. 284.—SACRAL ANUS.

Made in bone-flap operation when it was impossible to establish aperture in normal position.

made upon the right side of the sacrum because it is much more convenient to operate from this side, the bone-flap falls out of the way through gravitation, and because the rectum is slightly nearer the right side of the sacrum at its lower end; second, the peritoneal portion of

the operation is completed and the cavity closed before the gut is opened at all; third, the extirpation of the rectum itself is made from above downward, in which line the cleavage of the parts is much more easily determined than from below upward; fourth, the hæmorrhage is



FIG. 285.—FINAL STEP IN BONE-FLAP OPERATION.

G, gauze draining retro-rectal space; T, tampon and drainage-tube in anus.

practically controlled by tying off the middle and lateral sacral arteries in the beginning, and clamping the superior hæmorrhoidal artery before the lower dissection is made. The author does not mean to claim any originality by pointing out these distinctions, but simply to impress upon the reader the points in which he has found it advisable to modify the original Rehn-Rydygier technique.

The objections urged against this operation are that the bone does not reunite, and necrosis is likely to occur. The author has not seen a single case of necrosis follow the bone-flap operation, and in every case in which he has employed it the bone has reunited in fairly accurate position. In two or three cases suppurating sinuses through the transverse incision have developed, but they have invariably healed without secondary operation. Some operators do not suture the flap back in position, and claim that to leave the entire wound open furnishes better drainage and affords a safeguard against sepsis. It appears, however, that the long, oblique opening below is sufficient for this, and that

suturing the bones in position accomplishes a more accurate restoration of the parts and quicker healing.

The other modifications of Kraske's operation consist simply in different incisions of the soft parts and treatments of the bones as is

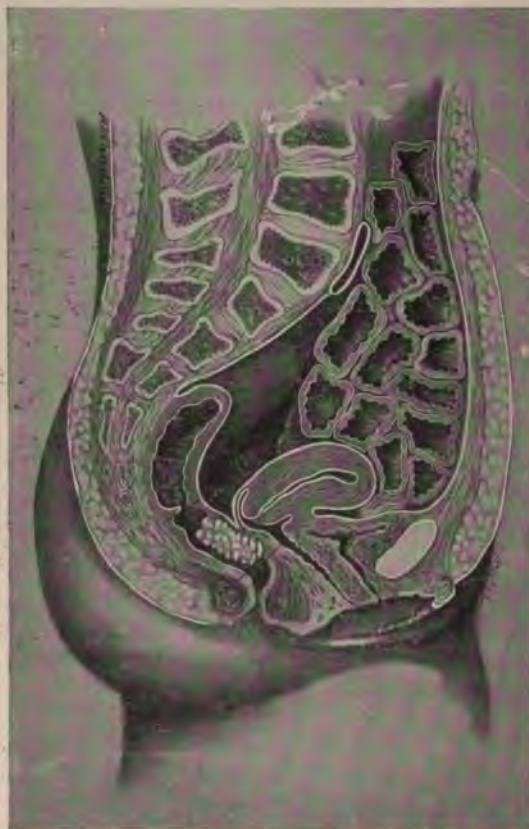


FIG. 286.—RECTAL CARCINOMA INVOLVING VAGINAL WALL.

seen in the illustrations (Figs. 269 to 276). The technique of removing the rectum after it is exposed is the same in all. They possess no advantages over the bone-flap method during the operation, and leave a gap in the pelvic floor which is, to say the least, undesirable. The author no longer employs these methods, and will not describe them in detail.

THE VAGINAL METHOD.—Extirpation of cancer of the rectum through the vagina was first done by Desguins (*Annales de la société de méd., d'Anvers*, 1890) in a case in which the recto-vaginal septum was involved.

The steps of this original operation are not very clearly described, but it appears to have been a perinaeo-vaginal procedure, with conservation of the sphincters. The patient died, but the cause of death was not stated. Norton (*Trans. Clin. Soc., London*, 1890) performed the operation in the same year, excising the entire lower segment of the gut, including the sphincter, and suturing the bowel to the skin. This patient made a good recovery, and had faecal control within a short time after the operation. Campenon (*Union médicale*, October, 1894), Rehn (*Centralbl. f. Chir., Berlin*, 1895, S. 241), Vautrin (*Gaz. hebdom. de méd. et de chir.*, 1896, p. 283), Price (*Med. and Surg. Reporter*, 1896, p. 66), Bristow (*Med. News*, 1896, p. 40), Byford (*Annals*

of Surgery, 1896, p. 631), and Earle (Proc. Am. Proctologic Soc., 1899) have adopted this method with various degrees of success. Gersuny employed it in 14 cases with only 2 operative deaths (Sternberg, *Centralbl. f. Chir.*, 1897, S. 305).

More recently Murphy, of Chicago, has reviewed this subject in detail, and reported 5 successful cases. Up to 1897 most operators confined this method to tumors in the middle and lower portions of the rectum, but with the development of the vaginal method in gynæcological operations, it became more and more apparent that even the uppermost portion of the sigmoid flexure could be reached and extirpated by this route. The method is therefore no longer limited to the rectum, but is even advocated in carcinoma of the lower loops of the sigmoid. The technique of the operation, as laid down by Murphy, is as follows:

The patient is placed in the lithotomy position, with the hips slightly elevated. The site of the tumor determines whether the peritonæum should be opened or not (Fig. 286). The vagina is dilated with broad retractors, the cervix drawn down, and Douglas's *cul-de-sac* opened by a transverse incision just below the cervical juncture. The small intestines are then pushed upward out of the way, and the peritoneal cavity is packed with large laparotomy sponges or pads, a careful count being kept of the number used. The recto-vaginal

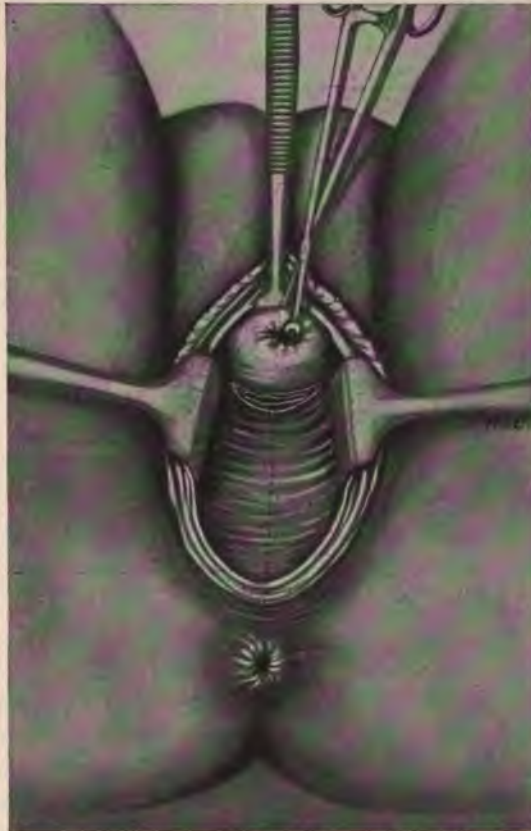


FIG. 287.—INCISION IN VAGINAL EXTIRPATION (Murphy).

septum is then divided by a vertical incision in the median line, extending from the first incision down to the margin of the anus, and including the external sphincter (Fig. 287). The vaginal wall is then dissected

from its attachments to the rectum, thus exposing this organ in its entire length and enabling one to examine it and drag down the sigmoid flexure almost at will (Fig. 288). At this point Murphy divides the



FIG. 288.—SEPARATION OF RECTUM FROM VAGINAL WALLS (Murphy).

anterior rectal wall up to the lower border of the tumor, and incises the gut transversely 1 inch below the lower limits of the growth, carrying the incision into the retro-rectal tissue (Fig. 289). The proximal end of the gut is then grasped with forceps, which close it, and by the use of curved scissors it is separated from its posterior attachments as far as the promontory of the sacrum, or at least sufficiently far for the bowel to be drawn down until its healthy portion reaches the lower segment without undue tension. The gut is then amputated above the growth (Fig. 290), and the upper and lower segments are united end to end by silkworm

sutures. These sutures should be passed from without inward, the knots being tied upon the inside, and the ends left long to facilitate their removal. The wound in the anterior wall of the rectum is closed in the same manner, and the ends of the sphincter brought together by buried catgut sutures (Fig. 291). After the laparotomy pads are removed, the peritoneal wound is closed with a continuous catgut suture, and the vaginal wound is brought together with silkworm-gut sutures (Fig. 292). A large drainage-tube is introduced through the anus above the point of anastomosis and sutured in position, the vagina and external parts being dressed with sterilized gauze. Murphy does not advise preliminary colostomy, and it is difficult to understand how he can avoid a certain

amount of infection in this operation, as the gut is cut across and opened in the operative field before the peritonæum is closed. This and the fact that a large space is necessarily left in the hollow of the sacrum on account of the removal of the cellular mass in which the glands are found, renders it very important that adequate drainage for this cavity should be furnished. The author therefore varies Murphy's technique by commencing the operation with a semicircular incision between the anus and coccyx, and extending into the retro-rectal space. With the fingers or a dull instrument the cellular tissues and rectum are separated from the anterior surface of the sacrum and coccyx as high up as the growth extends. After this has been accomplished, the wound and sacral concavity are packed with iodoform gauze to control the oozing, and the vaginal portion of the operation is then conducted according to Murphy's technique, with the exception that the gut is not cut across until it has been freed from all its attachments, dragged down as far as is necessary, and the peritoneal cavity closed by sutures or firm packing. The post-anal wound and loosening of the retro-rectal tissues not only furnishes adequate drainage in case of leakage, but it facilitates the dissecting out of the rectum and saves time in the operation. The use of silkworm-gut sutures in the intestinal wall necessitates their removal, usually under anæsthesia; on the other hand, ten-day chromicized catgut serves every purpose, and does not require to be removed. With these few modifications, the author be-



FIG. 289.—RECTUM LAID OPEN AND CUT ACROSS BELOW
NEOPLASM (Murphy).

With these few modifications, the author be-

believes this technique of Murphy to be a most useful addition to rectal surgery.

On the whole, however, except in cases where the vaginal wall or the uterus is involved, there is no great advantage in the vaginal route over the perineal and bone-flap operations described above. It requires more time, there is greater loss of blood, and there is more danger of infection through uterine discharges and dribbling of urine than in the sacral operation. Surgical shock is somewhat greater in the sacral than it is in the perineal or vaginal operations, but this is more than compensated by the diminished loss of blood. The results thus far

reported are entirely favorable to the vaginal route, but the number of operations is not sufficiently large as yet to justify its universal adoption.

ABDOMINAL METHOD.—Operations on the pelvic organs with the patient in the Trendelenburg position early demonstrated the feasibility of removing neoplasms of the upper rectum and sigmoid flexure through the abdominal route. Where the tumor is limited to that portion of the intestinal tract entirely surrounded by peritonæum, especially where it is in the movable sigmoid and can be drawn out of the abdominal wound, this method is undoubtedly superior to all others.

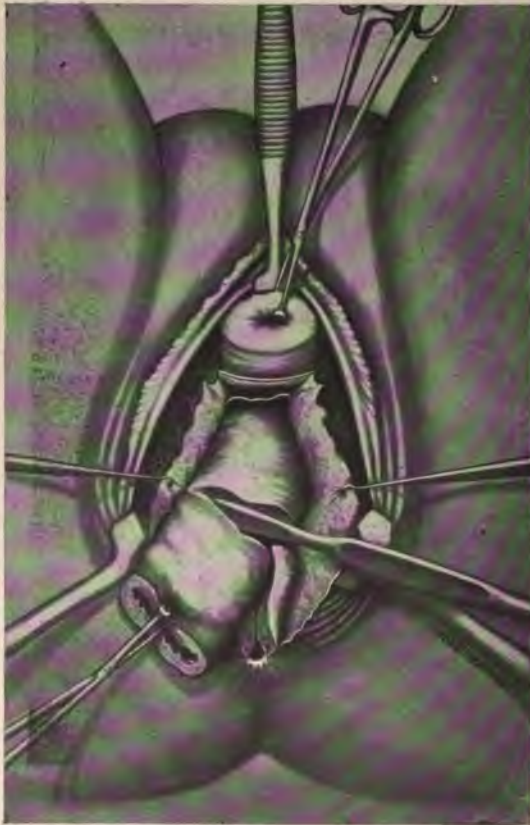


FIG. 290.—RESECTION OF INVOLVED AREA IN VAGINAL EXTIRPATION OF THE RECTUM (Murphy).

It involves no great mutilation of tissues, and the excision can be quickly executed by the aid of a Murphy button or O'Hara clamp. Where the tumor is well below the promontory of the sacrum, however, in that portion of the gut only partially covered by perito-

næum, complete removal by this route alone is attended with many difficulties.

Mann, of Buffalo (Jour. of the Amer. Med. Ass'n, vol. ii, p. 23), has recently advocated the method even in these latter cases. He states that by the aid of the Murphy button end-to-end union can be obtained even in that portion of the intestine well below the peritoneal *cul-de-sac*. His experience (3 cases with 1 death) is too limited to warrant any conclusions with regard to the operation. Murphy himself, Marcy, and the author have applied the button in cases where there was no peritoneal covering on one segment of the gut, and almost invariably leakage and a fistula have followed. In the sacral operation, where there is wide drainage below, this has not resulted in any serious consequences. In an abdominal operation, however, in which there is no dependent drain-

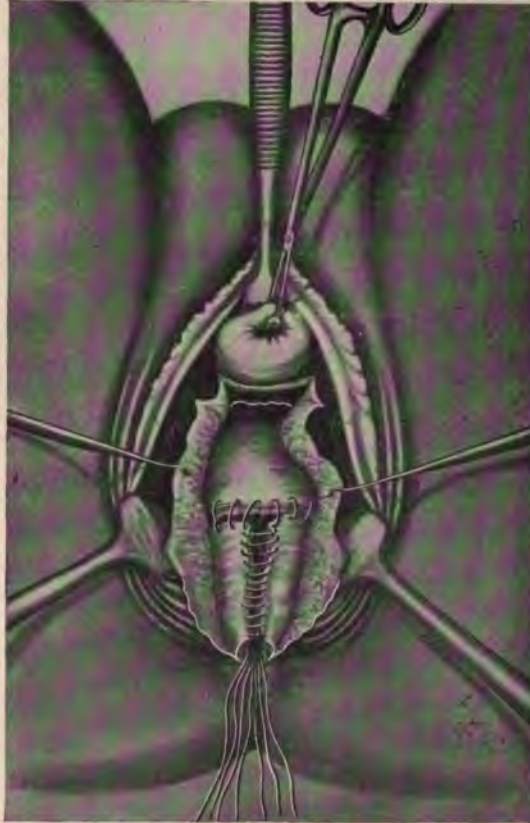


FIG. 291.—RESTORATION OF GUT IN VAGINAL EXTIRPATION OF THE RECTUM (Murphy).

age, such an accident as this will almost certainly prove fatal. End-to-end suturing of the gut deep down in the pelvic cavity is one of the most difficult procedures, as the author can testify from three attempts, in two of which he was compelled to abandon it and employ another method. In his opinion, therefore, the abdominal method should be limited to those cases in which the neoplasm is entirely within the peritoneal portion of the intestine.

As early as 1895 Kelly resected the upper portion of the rectum and a part of the sigmoid, and invaginated the proximal end of the latter through a longitudinal slit in the anterior wall of the rectum in Doug-

las's *cul-de-sac*; thus the peritoneal surface of the sigmoid was held in contact with a comparatively wide surface of the peritonæum covering

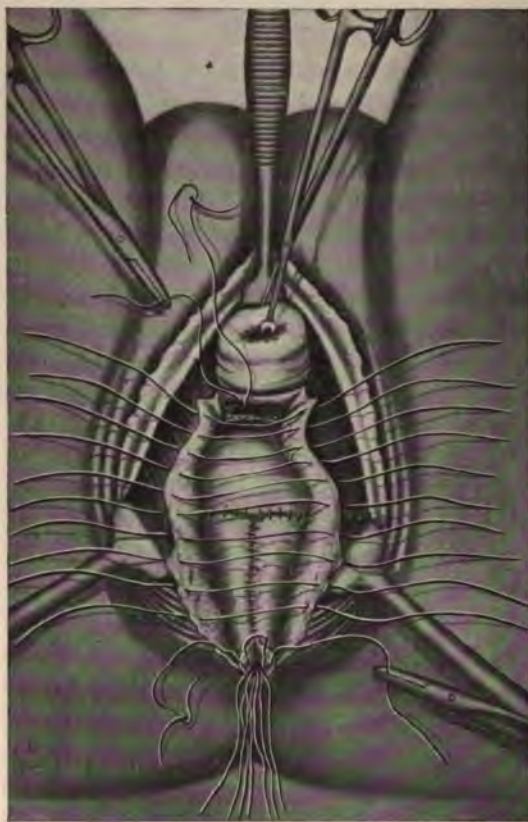


FIG. 292.—CLOSURE OF PERITONÆUM AND VAGINAL WOUND AFTER VAGINAL EXTIRPATION OF THE RECTUM (Murphy).

the rectum. The upper end of the resected rectum was invaginated and closed by Lembert sutures.

Following his suggestion, the author has employed this method three times, twice in resection of the sigmoid and upper rectum for carcinoma and once in entero-anastomosis for irremovable cancer of the sigmoid. The first of these operations was done in March, 1896. The patient was suffering from carcinoma of the last loop of the sigmoid 9 inches above the anus. An oblique abdominal incision 4 inches in length was made about 1 inch inside of the ordinary incision for colostomy.

After the peritoneal cavity had been opened, the patient was placed in the Trendelenburg posture, and the small intestines and omentum were forced upward toward the diaphragm and held there by large abdominal pads. The tumor was isolated by incising the mesosigmoid down to a point about opposite the second sacral vertebra, where the gut appeared to be healthy. Two ligatures were thrown about the intestine at this point, and it was cut transversely between them, gauze being packed all around the parts in order to prevent soiling the peritonæum with intestinal contents. The upper segment was drawn out of the abdominal wound, cauterized with carbolic acid, and covered with protective tissue. Without removing the gauze packing, the lower segment was similarly cauterized, its edges invaginated, and closed by Lembert

sutures; after this the gauze packing was removed and the cut edges of peritonæum composing the mesentery were drawn together with fine silk sutures. The segment of the gut containing the carcinoma was then excised, a stout ligature having been placed around the intestine about 1 inch above the transverse section. The mucous membrane of the upper segment was then cauterized with pure carbolic acid and dried with gauze. After this four long sutures were placed equidistant in its circumference, the ends of each being tied together so as to form a loop. An incision of about $1\frac{1}{2}$ inch was then made in the anterior wall of the rectum through the peritoneal *cul-de-sac* after the sphincter had been stretched and the anus thoroughly irrigated. A long forceps was then introduced through the anus and through this incision, by which the loops in the proximal end of the gut were grasped and brought out below. These loops were thoroughly twisted together so as to narrow the aperture of the gut before any traction was made upon it. After this the sigmoid was dragged downward and invaginated through the incision in the anterior wall of the rectum (Fig. 293). When the end of the upper segment had passed through the incision the ligature surrounding the intestine was cut off. The long sutures attached to the intestine were wrapped around a hæmostatic forceps, which was twisted until they held the bowel comparatively taut, and this was allowed to lie across the anus as a sort of windlass. A gauze drain was carried down to the point of invagination and out through the lower angle of the abdominal wound, which was then closed except



FIG. 293.—COLORECTOSTOMY (Kelly) OR INVAGINATION OF COLON THROUGH A SLIT IN THE ANTERIOR WALL OF THE RECTUM.

at this point. The healing of the parts was uneventful, but at the end of one month it was apparent that the caliber of the gut at the point of invagination was entirely too narrow. In order to overcome this the patient was placed in the Trendelenburg posture and a hysterectomy clamp was passed upward through the anus, one blade of it being carried through the narrowed orifice into the sigmoid and the other into the upper segment of the closed rectum (Fig. 294). The clamp, being closed and tightened daily, cut its way through in five days, thus materially widening the caliber of the gut. From that time forward the patient's symptoms continued to improve. He gained in flesh and

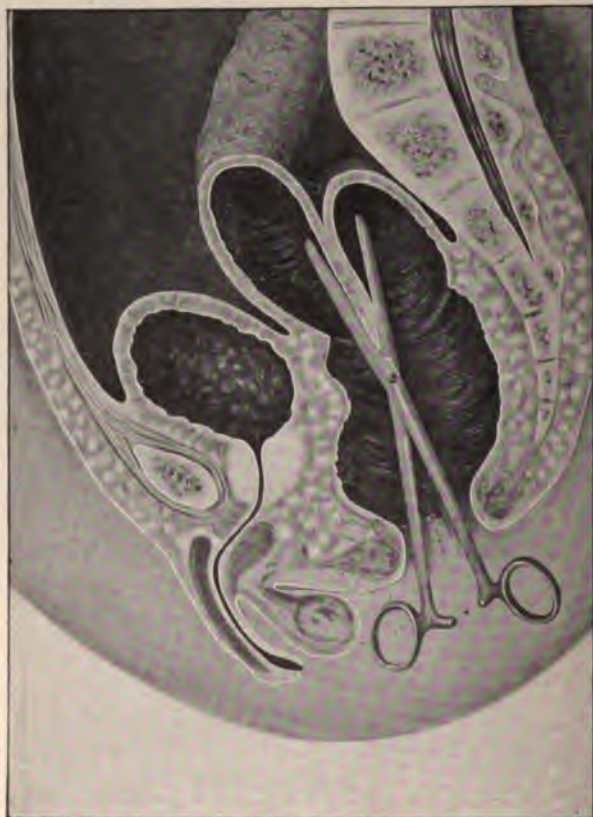


FIG. 294.—METHOD OF WIDENING THE CALIBER OF THE GUT AFTER COLORECTOSTOMY.

strength, and up to April, 1902, had presented no signs of recurrence. The *cul-de-sac* formed by the closing of the upper end of the rectum gradually atrophied and apparently disappeared (Fig. 295). At the last examination a sigmoidoscope of 25 millimeters in diameter was passed into the sigmoid flexure without any difficulty. In the other cases of resection in which this method was employed no drainage was used, and the abdominal cavity was closed on completing the operation. A longer incision was made in the

rectum in one instance, and it was not necessary to afterward enlarge the opening in the gut at the point of juncture. This patient was observed for two years, and remained well during that period. He disappeared, however, and has not been heard from in the past eighteen months.

Where the tumor is low down in the sigmoid and yet can be removed, at the same time preserving the anterior wall of the rectum, it appears to the author that this method is superior to attempts at end-to-end union, inasmuch as there is a wide apposition of the peritoneal surfaces and the proximal end of the sigmoid is carried well within the rectum, thus avoiding any great danger from leakage and peritonitis.

Where the tumor is confined to the sigmoid proper and can be brought outside of the abdominal wound, resection should be made according to the accepted methods of intestinal surgery. The author has resected the sigmoid flexure nine times, in five of which the operation was done for malignant growths, with one fatal result. He has invariably employed a Murphy button which fitted loosely in the caliber of the gut, and reenforced it with Lembert sutures. While he is aware that this is contrary to the teachings of Murphy himself, nevertheless it appears safer to have a supplementary guard against leakage, and from his experience he sees no reason to alter this course. End-to-end suturing, with or without the aid of an O'Hara clamp, may be employed in these cases, but it consumes more time than the application of the Murphy button, and does not give any better results.

The thought has suggested itself that in carcinoma of the sigmoid, in which the tumor can be brought entirely outside of the abdominal wall, it might be safer to fix it in this position until the peritoneal cavity is closed off by adhesions, and then excise it extra-abdominally. This would involve an artificial anus, to close which finally it would be necessary to employ end-to-end union of the segments, and this might be quite as dangerous as performing the entire operation at one sitting. The case which suggested this thought was the fatal one in this series. The stricture in this instance was so tight that it was impossible to thoroughly empty the bowel before the operation; as a consequence of



FIG. 295.—RESULT OF COLORECTOSTOMY FOR CARCINOMA AS SEEN THROUGH PROCTOSCOPE FIVE YEARS AFTER OPERATION.

this there was a large mass of hard faecal balls in the colon above the site of the tumor. The gut was dragged outside of the abdominal wound after it was cut across above the tumor, and as many of these as possible were removed, but unfortunately one of those high up in the transverse colon came down and obstructed the aperture in the Murphy button, thus causing obstruction and tearing of the gut, which was followed by peritonitis and death. In such cases, therefore, where the upper bowel can not be emptied before the operation, the author would advise either making a temporary colotomy until the bowel could be cleaned out, and then removing the neoplasm at another sitting, or the employment of the extra-abdominal method suggested above. It is unnecessary to go into the details of intestinal resection as applied to the sigmoid flexure. This operation is described in all modern works on general surgery. The author prefers the use of the Murphy button supplemented by Lembert sutures, but excellent results may be obtained by other methods. That the button may be retained there is no doubt. We have failed to recover them in 6 cases, but in none of these has it seemed to do any harm. The other complications which are said to follow its use have not been met with, and are certainly no more frequent than those which occur in end-to-end union or lateral anastomosis by sutures. To conclude this subject, the abdominal operation alone should be reserved for neoplasms of the pelvic colon as defined in the chapter on Anatomy.

COMBINED METHODS: *Abdomino-anal, Abdomino-perineal, Abdomino-sacral.*—A combination of the abdominal with the other methods for extirpation of the rectum has been suggested from time to time during the past two decades. In carcinomas of the extreme upper end of the rectum and lower portion of the sigmoid it has been found easier to loosen the gut from its higher attachments through an abdominal incision than through the perineal, vaginal, or sacral routes. These combinations are termed the *abdomino-anal*, the *abdomino-perineal*, and the *abdomino-sacral* methods.

Abdomino-anal Method.—Maunsell (London Lancet, August 27, 1892, p. 473) first suggested this operation. He opened the abdomen by median incision above the pubis, incised the peritoneal attachments of the bowel, and loosened it well above and below the growth. He then passed a loop of tape by a long mattress needle from the abdomen through the rectum and out of the dilated anus. With this loop he pulled the neoplasm down through the anus, thus everting the lower part of the rectum. He suggested that, if the tumor were large, it might be necessary to incise the anus back to the coccyx in order to bring the growth outside of the body. The tumor thus exposed was then resected, and the healthy ends of the intestine united by sutures. The everted and

prolapsed rectum was then restored to its position, the peritoneal wound sutured from the abdominal side, and the abdominal wound closed in the ordinary way.

Weir (*Jour. Amer. Med. Ass'n*, 1901, vol. ii, p. 801) states that in a trial of this method he was unable to bring the tumor through the divided anus, and that forcible traction upon the tape enlarged the opening through which it passed into the bowel, so that the contents of the latter escaped into the peritonæum. He therefore modified the operation as follows:

After making an abdominal incision with the patient in the Trendelenburg posture and forcing the small intestine up into the abdominal cavity with an artificial diaphragm, he ties the inferior mesenteric artery as it passes over the promontory of the sacrum. He then loosens the sigmoid and rectum by incision of the peritonæum and blunt dissection down to the tip of the coccyx and

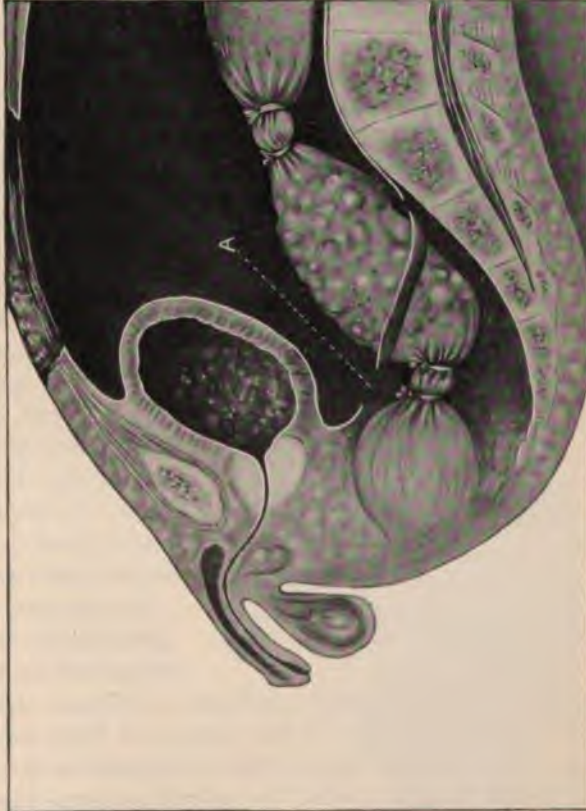


FIG. 296.—ABDOMINO-ANAL EXTIRPATION OF HIGH RECTAL CANCER
—ENUCLEATION OF DISEASED PORTION THROUGH ABDOMINAL ROUTE.

lower border of the prostate. At this point, below the tumor, two iodoform tapes are tied around the gut about an inch apart, and the latter is cut through between them (Fig. 296). The upper portion of the bowel is then dragged out through the superior angle of the abdominal wound and the neoplasm is excised. The lower end of the rectum is then seized by forceps in the hands of an assistant, who everts it through the anus. A long forceps is then carried through this everted

rectum into the pelvis, and with it the upper bowel is grasped and dragged down through the everted lower end. Two needles are then passed through the invaginated ends in order to maintain the parts in



FIG. 297.—ABDOMINO-ANAL EXTIRPATION.

Sigmoid is brought down through everted rectum and sutured after method of Weir.

position, and the upper and lower ends of the gut are sutured together (Fig. 297). The fixation needles are then removed and the invaginated gut is restored to its position (Fig. 298). The peritonæum is then sewed together and to the bowel so that the general abdominal cavity and the pelvis are separated from each other, and the abdominal wound is closed. The operation is completed by an incision posterior to the anus and just in front of the coccyx, extending into the pelvic space from which the tumor has been removed, and through this a tube is introduced to secure drainage; a second smaller tube, wrapped with iodoform gauze, is carried into the rectum and through the sutured area to facilitate the escape of gas and prevent the intestinal contents from coming in contact with the wound.

At the time of Weir's report the operation had been employed three times, with two recoveries and one

death. There was some tendency to stricture at the point of suture, but this was overcome by the passage of Wales bougies. The strictest rules of asepsis are insisted upon, the ends of the bowel at each point of section being cauterized by carbolic acid, and the pelvis is repeatedly washed with sterilized salt solution after the rectum has been everted.

Weir advises that the eversion of the lower bowel, the suturing of the ends together, their replacement, and the introduction of drainage-tubes should be trusted to a competent assistant, and that the surgeon should restrict himself to the interior abdominal work in order that the strictest asepsis may be maintained. This modification of Maunsell's method is a fine conception, and appears to be well worthy of further trial. The chief difficulty in its performance will be found in loosening the gut sufficiently to invaginate it through the anus without impairing its circulation. Where the superior hæmorrhoidal artery is tied off, the

chief supply to the lower segment of the gut is obliterated with the exception of that slight portion furnished by the middle hæmorrhoidal artery. It sometimes happens, therefore, that the anastomotic circulation is too feeble to maintain the vitality of the intestine, and gangrene occurs. It is important, therefore, when the end of the gut is cut across, to observe whether the circulation in it is sufficient to supply its needs. Where there are no pumping arteries upon transverse section it is better to cut the gut off at a higher level until such are found. This suggestion applies with equal force to the sacral, perineal, and abdominal methods. The author has seen gangrene occur three times from this default, and in future, whenever he fails to observe a satisfactory blood supply in the superior segment of the gut, he will undoubtedly carry the latter out through the abdominal opening and convert it into an artificial anus rather than take the chances of this accident.

Abdomino-perineal and Abdomino-sacral Methods.—In 1884, Czerny, in attempting to remove a high cancer of the rectum by the perineal method, found himself unable to complete the extirpation from below. Rather than leave the patient in a hopeless condition, he boldly resorted to abdominal incision and completed the operation through this route. This was the first application of the combined method, but it was not a preconceived procedure. Maunsell, as we have stated elsewhere, was the first to conceive the idea of premeditatedly opening the abdominal cavity for the extirpation of a cancerous rectum. Chaput (*Finet, op. cit.*, p. 338), on August 27, 1894, deliberately performed a median laparotomy to loosen the cancerous rectum from its higher attachments before extirpating it by the sacral method. To him, perhaps, should be accorded priority in the combined sacro-abdominal procedure. Gaudier, to whom this priority is sometimes attributed, premeditatedly performed the abdomino-perineal operation in November, 1895, more than a year after Chaput's operation. He made a median laparotomy, cut the gut transversely above the tumor, loosened its lower end as

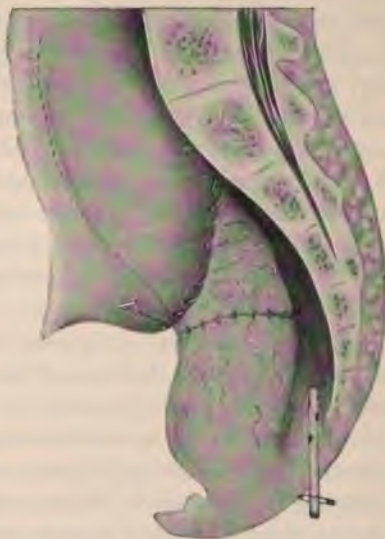


FIG. 298.—FINAL STEPS IN ABDOMINO-ANAL EXTIRPATION.

Peritoneal cavity closed, intestinal tract restored, and drainage-tube fixed in retro-rectal space.

far down as the mesorectum, then fixed the upper end in the abdominal wound for an artificial anus, and finally dissected the rectum out by the perineal route from below. Challot performed this same operation with some modifications only a month later. The chief point in his technique, however, consists in preliminary ligature of the superior hæmorrhoidal artery just before it passes into the pelvic cavity. He therefore appears to have preceded Weir in this precaution.

Boeckel (*Société de chir.*, October 28, 1896), in removing a high cancer by the Kraske method, found himself in the same position as Czerny, and was forced to do a laparotomy in order to complete the extirpation. The steps which he advises after describing his case are as follows:

Isolate the rectum as far as possible through the sacral route, create an artificial anus in the descending colon or the sigmoid flexure by cutting the gut squarely across and dragging its superior end out of the abdominal wound, then loosen all the intestine below this point and extirpate it by the sacral way.

The writer can see no advantage in this latter suggestion. If the gut has been liberated entirely from below before the laparotomy is made, what possible good can come from turning the patient upon his side again simply to draw the gut out from below instead of removing it at once through the abdominal wound? In such cases the abdominal wound should be made wide enough to thoroughly manipulate the parts, and this turning of the patient backward and forward not only disturbs the relationship of the abdominal organs, but it also predisposes to accidents of infection.

All the combined operations described above leave the patient with an artificial anus. Giordano (*Clin. Chir.*, Milano, 1896, p. 463) devised and carried out a combined abdomino-perineal operation for extirpation of cancer high up, which he completed by dragging the superior segment of the resected gut down through a slit in the gluteal muscles and suturing it to the skin. Before attempting to remove the rectum, Giordano tied both internal iliac arteries. It is not stated whether this was done with a simple view of controlling hæmorrhage or with the intent of starving out the cancerous process by cutting off its blood supply, as has been suggested by Pryor and others in cancer of the uterus. Shortly after this Quénu (*Société de chir.*, November 4, 1896) performed a similar operation, but advised approaching the organ through the sacral or perineal way first, and then completing the abdominal part of the operation afterward. Reverdin reversed this procedure (Quénu and Hartmann, *op. cit.*, ii, p. 292) in a remarkable manner. After opening the abdomen and incising the gut transversely above the neoplasm, he

loosened the upper segment for 12 or 15 centimeters, dragged it out through the upper angle of the abdominal wound, and tied into it a glass cylinder with a depressed groove around one end, into which a ligature drawn around the gut fitted, thus holding the tube in position. The gut was thus sutured with 12 centimeters entirely outside of the bowel. To the end of the glass tube which was thus fitted in the intestinal caliber a rubber drainage-tube was attached, which was carried into a basin beneath the bed. All these precautions were taken to prevent the possible soiling of the wound by the discharges from the intestinal canal. The lower segment of the gut containing the neoplasm was then excised, the peritoneal toilet completed, and the wound dressed in the usual way. He states that his patient died three days later from exhaustion from feebleness ("par l'épuisement, par faiblesse"). To those familiar with this class of surgery, Reverdin's description will carry the conviction that the cause of death in this instance was nothing more nor less than septic peritonitis of a subacute type, notwithstanding all the precautions which he took to avoid faecal extravasation.

On July 30, 1896, the author removed by abdominal section a large carcinoma of the sigmoid and upper rectum as follows: The abdomen was opened in an oblique line, beginning just above the pubis and extending upward to a point 1 inch inside of the left anterior superior spine of the ilium. The sigmoid flexure was dragged upward and out of the wound, its mesentery incised about midway between the gut and sacrum, beginning at a point 2 inches above the tumor; the vessels were caught with pressure forceps as the dissection proceeded. The superior hæmorrhoidal artery was cut during this process and tied off. After the section of gut containing the tumor was loosened down to a point about opposite the third sacral vertebra, the gut was surrounded with two ligatures below the growth, and, being thoroughly protected by gauze pads, was cut through transversely. The upper segment, containing the neoplasm, was drawn outside the wound, a ligature was placed around it above the growth, and it was again cut off below this ligature, thus extirpating the neoplasm. The cut ends of the two segments were cauterized with pure carbolic acid and covered with iodoform gauze. The patient was then turned upon his side, a lateral sacral incision was made, and the upper end of the lower segment was dissected out and dragged through this wound; with a long forceps the upper segment was then seized, brought out through the sacral wound, and an end-to-end union of the two parts was accomplished by Czerny-Lembert sutures. The gut was then replaced in the pelvis, gauze drainage was placed around the point of union, and the sacral wound left open. The patient was then turned upon his back again, the peritoneal floor of the pelvis was sutured, and the abdominal wound closed without any

drainage. The patient died upon the fourth day, supposedly from suppression of urine, but later observations lead us to conclude that the true cause was sepsis.

Following in the footsteps of Giordano, Quénu has formulated a technique for the combined operation, as follows:

First, open the abdomen in a median line and ligate both hypogastric arteries.

Second, free the sigmoid loop, cut it across between two ligatures with a thermo-cautery, and establish an artificial anus in the left inguinal region by means of the upper segment.

Third, liberate the lower segment by incision of the lateral and posterior peritoneal bands and dull dissection below this point down to the tip of the coccyx and lower border of the prostate. In this dissection the superior hæmorrhoidal artery will have to be tied. The intestine thus loosened is dropped down into the pelvis, covered over with sterilized gauze, and the abdominal wound is rapidly closed.

The patient is then placed in the lithotomy position, the perianal region recleansed, and the lower portion of the rectum is extirpated by the perineal method heretofore described. In establishing the artificial anus Quénu drags the gut out through an incision in the abdominal wall in the inguinal region and sutures it to the different layers. He leaves the ligature around the protruding end for several hours in order that adhesion between the peritoneal surfaces and the wound may take place before any danger of infection from the escape of fæces can occur. Finally, the abdominal wound is sealed off by "adhesol."

The author has modified this technique in his operations by the combined method, as follows: The abdomen is opened by a long colostomy incision on the left side. The sigmoid is dragged out of the abdomen and cut transversely between two ligatures at a point 1 inch above the growth, the ends being cauterized with carbolic acid and covered with rubber protective. The lower segment is then dissected out without tying the hypogastric arteries. The superior hæmorrhoidal is either ligatured beforehand (Fig. 299) or caught and tied if cut. After dissection has gone below the tumor, the latter is excised between two ligatures and removed from the abdominal cavity. If end-to-end union between the remaining segments is feasible it is employed; if it is not, the lower segment is invaginated and closed by sutures. The peritoneal breach below is then sutured, and an artificial anus is made after the manner of Bailey, and the abdomen closed.

Where the anus needs to be extirpated no abdominal operation is necessary; the perineal or sacral methods will accomplish all that is justifiable in these cases, and laparotomy only adds to the shock and exposes the patient to greater danger of sepsis. The mortality from

these combined methods has been very high, and they should not be employed save in exceptional cases.

Disposition of the Intestinal Ends.—Operations by the sacral and abdominal methods largely resolve themselves into resections of the intestine. Under such circumstances one has always to deal with two intestinal ends, and the disposition of these is a question of much importance. Kraske (*Centralblatt f. Chirur.*, 1891, S. 942) in his earlier operations only sutured the anterior circumference of the rectum in

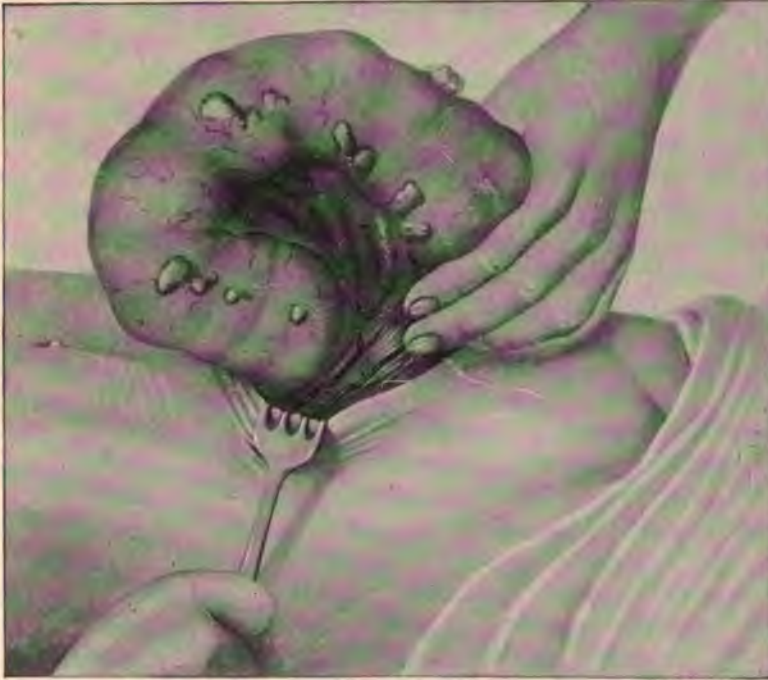


FIG. 299.—EXPOSURE OF HEMORRHOIDAL AND SIGMOIDAL ARTERY IN ABDOMINAL EXTIRPATION OF THE RECTUM.

order to prevent retraction of the two ends, and left the posterior portion open so that the faecal materials could be thus discharged without any obstruction. Later, however, he advised suturing the entire circumference, although admitting that leakage and fistula would likely occur.

Hochenegg dissected off the mucous membrane from the lower end of the rectum and invaginated the upper segment of the gut through this freshened canal, suturing it to the skin about the margin of the anus. This is a most excellent method where the upper segment is sufficiently long to be brought down through the anus without undue ten-

sion or interference with its circulation. In cases where the length is not sufficient, the gut may be sutured in the upper angle of the sacral wound, thus establishing an artificial sacral anus, for the control of which Hochenegg has devised an ingenious and quite satisfactory truss. Perron (*Gaz. hebdom. de Bordeaux*, 1890) described a method similar to that of Maunsell. He everted the lower end of the rectum, dragged the upper segment down through this, and sutured the two ends of the gut together by circular suture. He then allowed the parts to slip back into position, and introduced a drainage-tube through the anus up beyond the sutured area. The author has performed this method twice with very satisfactory results.

In cases in which a preliminary artificial anus has been made, the treatment of the intestinal ends will depend largely upon whether it has been determined to maintain this anus permanently or only as a temporary measure. When it is seen upon abdominal exploration that there is no probability of reestablishing the normal faecal channel, then a permanent artificial anus should be made, either by the Bailey method or by cutting the gut transversely across, closing the lower end and dropping it back into the abdomen, and establishing the new anus in the upper segment, after the manner of Witzel. The extirpation is undertaken some days later, and the treatment of the section below the artificial anus will depend largely upon the type of inguinal anus employed. If the gut has been cut across and the segment dropped back into the abdominal cavity, it may be removed in its entirety along with the tumor, it may be closed after the tumor has been resected and the closed segment left to atrophy, or its lower end may be sutured in the upper angle of the sacral wound. If the artificial anus has been made after the ordinary spur method, with a double-barreled aperture, the lower leg of this spur, after the tumor has been resected from below, may be everted through the inferior aperture of the artificial anus and clamped or tied off with a ligature (Quénu). It may also be fixed in the upper angle of the sacral wound, where it will form a sort of mucous fistula, which eventually atrophies and closes spontaneously. Some surgeons simply tie a ligature around it and leave the gut loose in the wound. This is a dangerous experiment, for sepsis is likely to follow, however thorough the drainage. The invagination and excision of the segment through the lower opening of the artificial anus is more satisfactory when it can be accomplished, but sometimes the attachment of the mesosigmoid, adhesions, or other complications render this almost impossible, and one must resort to the other methods.

Where the two ends of the bowel can be brought together after resection of the tumor they may be united either by suturing or by the aid of a Murphy button. The author has employed the latter method

a number of times, and, while it does not prevent the formation of a fistula, it facilitates the bringing of the ends together and enables one to introduce a supplementary row of Lembert sutures around it much more rapidly. Mayo, Meyer (*Annals of Surgery*, 1896, p. 687), and Marcy (*Boston Med. and Surg. Jour.*, 1893, p. 561) have all employed the Murphy button in these cases, but in almost every instance posterior fistula has followed its use.

Where the upper segment is sufficiently long to accomplish it, the author prefers the Perron or Hochenegg methods of treating the intestinal ends; but in cancers high up in the rectum these are not feasible, and one will find the Murphy button of great assistance in such cases.

Whatever method is employed in the treatment of the intestinal ends, it is necessary to thoroughly dilate the sphincter or incise it posteriorly in order to obviate any obstruction to the passage of fecal material and gases from the bowel. When end-to-end suturing has been employed, one should also pass a firm rubber drainage-tube through the anus and above the line of anastomosis in order to prevent any tension upon these parts from the accumulations of gases or fecal material.

COMPLICATIONS IN EXTIRPATION.—The accidents and complications connected with extirpation of the rectum for malignant disease may be described as immediate and remote.

Immediate Complications.—Hæmorrhage is ordinarily spoken of as one of the chief complications and contraindications in extirpation of the rectum. It can not be denied that operation by the perineal method is attended by considerable bleeding, and on this account it is inadvisable in cases already weakened by hæmorrhages from the growth itself. The operation by the sacral route, if conducted according to the technique already laid down, is not accompanied by any excessive loss of blood. The application of the ligature or clamp to the intestine before attempting to dissect out the lower portion of the rectum absolutely precludes the loss of much blood during this part of the operation. The author has succeeded in extirpating the rectum more than ten times without tying over four vessels. The secret of this lies in the fact that the same artery is cut many times in the course of extirpation, and if the operator stops to catch and tie it each time, the operation will be unduly prolonged and an unnecessary amount of blood lost. If the superior dissection and dragging down of the gut is all accomplished first and the peritonæum closed before the gut is cut across, the lower segment may be rapidly excised, gauze compresses being crowded into the wound as the dissection proceeds, and a very small amount of blood will be lost. As soon as the excision is completed these gauze compresses can be removed and the two or three vessels which bleed can be caught and tied. Practically the middle sacral,

the right lateral sacral, and two middle hæmorrhoidal arteries are all that are necessary to ligate. In only one case operated by this method has there been any excessive hæmorrhage, and this was due to the fact that undue traction upon the gut tore the superior hæmorrhoidal artery off at the promontory of the sacrum, and the presence of the gut in the wound rendered the catching and tying of this exceedingly difficult. This accident can be entirely avoided, as the gut should be brought down by clean dissection without dragging and tearing.

Escape of Intestinal Contents into Wound.—Another accident, and one of the most serious complications in extirpation, is the rupture of the intestinal wall and escape of its contents into the wound. This is also occasioned in the majority of instances by undue traction in attempting to loosen the gut by dull dissection. It may also occur from attempts to separate adhesions of the peritoneal *cul-de-sac*, or between the rectum and other organs, by blunt dissection. The best method of avoiding this consists in isolating the gut around its right side by clean dissection with scissors until the peritonæum is opened. As soon as this is accomplished the lateral peritoneal folds should be cut off close to the rectal wall. This will allow the gut to be brought down a considerable distance so that its healthy portion can be grasped. Upon this a clamp should be placed, and then the mesorectum can be cut loose close to the sacrum, thus enabling one to rotate the neoplasm and complete the dissection upon the left side without any undue dragging upon the diseased portion. The adhesions should be handled very gently, and those between the rectum and uterus or prostate should be shaved off rather than torn loose. Wherever it is possible, the entire intraperitoneal dissection should be completed and the gut drawn down to the extent desired before it is cut across; the section should always be accomplished well outside of the wound, and with the latter completely protected by gauze packing.

Injury to other Organs.—Injury to the ureters and bladder have frequently occurred during the course of rectal extirpation by the sacral method. A thorough knowledge of the anatomical relations alone will enable one to avoid these accidents. They are often occasioned by dragging upon the gut before it has been loosened from its lateral and anterior peritoneal attachments. These accidents also emphasize the importance of opening the peritoneal cavity early in the operation in order to establish one's landmarks. Twice in cases where the *cul-de-sac* has been obliterated by inflammatory adhesion the author has accidentally cut into the bladder, but the wounds were immediately sutured, and apparently the accidents did not interfere with the subsequent course of the operation. In one case the ureter was torn across, and an attempt was made to restore its caliber. This patient died forty-eight hours

later, and therefore the results of this effort could not be determined. The author knows of one case in which both ureters were torn off by attempting too much blunt dissection in this operation; great care is necessary to avoid these accidents, and it is much safer to separate the parts by clean incision than by dragging and tearing.

Post-operative Complications.—The chief complication which follows these operations is sepsis. As has been stated, over 75 per cent of the deaths occurring from extirpation of cancer of the rectum are caused by infection. Whether this is due to faulty technique, to the escape of faecal material during the operation, to rupture of the sutures after the operation, or to the presence of bacilli in the perirectal tissues at the time of operation, it is impossible to say. To the present time no technique has been devised which will positively secure asepsis in operations of this type. The precautions which were suggested for the prevention of the escape of faecal matter into the wound, the closure of the peritoneal cavity before the gut was incised, the avoidance of introducing the finger into the rectum and then into the wound, are all important in the prevention of this complication. While it seems impossible to avoid a certain amount of suppuration after extirpation, if the peritonæum can be protected this complication will not often prove serious. Some cases have succumbed to prolonged suppuration, but these compose a very small percentage of the fatalities.

Gangrene is the next most serious post-operative complication. This may be due to three causes: First, deficient blood supply of the superior segment, which has been referred to. Second, too great tension upon the superior segment. While the blood supply may be adequate, if the gut is sutured in a taut condition this may result in the acute flexure and occlusion of its arterial supply, which will result in gangrene of its lower end, with retraction or systemic infection, which brings about a fatal end. Third, it may occur from infection. In the first two instances the condition develops within the first twenty-four hours; in the last, the gut may appear perfectly healthy for two or three days, and then entirely slough away. There is no way to avoid this except through the most rigid asepsis. This complication more than any other inclines the author to the systematic employment of a preliminary colostomy, as he has seen gangrene occur in but one case where this has been done.

Abnormal Anus.—In certain cases after the tumor has been resected it will be found impossible to bring the gut down to the anus or the lower end of the resected rectum. Under such circumstances it becomes necessary to establish the anus in some abnormal position. This may be done in the inguinal region, after the method of Bailey, or, if the superior segment is long enough, it may be brought down and

stitched to the skin at the lower end of the coccyx; or, finally, the gut may be sutured in the upper angle of the sacral wound. The latter position is that advised by Hochenegg. The author is in favor of this procedure when the sphincters have been preserved; for, thanks to the prolapse which often occurs, it is occasionally possible at a later period to dissect the gut loose from this position and reestablish the anus in its normal position. When the sphincters are removed, however, better faecal control can be obtained through the modern inguinal anus.

Prolapse of the Gut.—Following extirpation of the rectum, especially where the anus is established in the sacral region, prolapse of the gut is very likely to occur. Sometimes when the anus is established in its normal position, an excessive mucous prolapse takes place. In the first instance, where the prolapse is complete and of sufficient length, the gut may be dissected out from its attachments, brought down and sutured at the normal site of the anus after the patient has regained his strength. Where the prolapse consists of mucous membrane alone, this may be excised after the manner of Whitehead, or it may be clamped off and cauterized, as has been described in the section on incomplete prolapse.

Incontinence.—Incontinence of faeces is a very frequent complication following*extirpation of the rectum. To avoid this, Gersuny (Centralbl. f. Chir., 1893, S. 553) has proposed twisting the gut two or three times around before it is sutured in position. This procedure has been adopted by numerous surgeons, notably by Gerster, and seems for the time being to be quite effectual. It does not remain permanent, however, for in the large majority of cases the incontinence returns after a longer or shorter period. In order to overcome this, Willems (Centralbl. f. Chir., 1893, S. 401) proposed carrying the superior segment through the fibers of the glutæus maximus muscle, thus constituting a sphincter ani. Witzel (*ibid.*, 1894, pp. 937 and 1262) first carried out this procedure, and with considerable success. Rydygier (*op. cit.*) carried the gut through the glutæus maximus and pyramidal muscles, and combined with this the torsion of Gersuny. Where the sphincter muscles are involved in the neoplasm and it is necessary to remove them, one should always establish a permanent inguinal anus before attempting to extirpate the new growth.

Stricture.—Stricture of the rectum of greater or less degree has occurred in many of the cases of resection, and even in a larger percentage of the cases of amputation. This complication is unavoidable. It can be limited, however, by the assiduous passage of bougies, which should be begun about ten days after the operation. If the patient is taught to use the bougie himself, the caliber of the gut may be practically maintained, and the stricture will not constitute a serious complication.

Functional Complications.—Diarrhœa and constipation are among the post-operative complications of this operation. They occur about equally in a given number of operations, and sometimes alternate with each other from day to day. The cause of the diarrhœa may be reflex irritation or infection. The treatment consists in thoroughly cleaning out the intestinal canal, irrigating the colon with astringent solutions, and regulating the diet in such a manner that the smallest amount of detritus possible will be produced. The constipation should be treated according to the principles laid down in the chapter upon that subject.

Injury to the nerves during the operation of extirpation has been frequently mentioned as the cause of incontinence. The author has not had the misfortune to observe any accidents of this kind. It is irrational to suppose that such operations as those of Bardenheuer and Rose could do otherwise than result in some alteration of the nerve supply to the lower end of the intestinal canal. In operations, however, restricted to that part of the sacrum below the third sacral foramina, no grave injury of this character is likely to occur.

Conclusions.—After this somewhat prolonged discussion of the various methods employed in extirpation of the rectum, it is incumbent to express an opinion as to when such operations should be undertaken and the preference in the selection of methods. It was stated that all cancers should be extirpated which are confined to the intestinal wall, are movable, and are not complicated by ganglionic or metastatic extension; adhesion to the bladder, uterus, or the prostate does not constitute a positive contraindication to the removal of the neoplasm; neither does enlargement of the inguinal glands, as this may be entirely inflammatory. The same may be said with regard to ganglionic enlargements in the sacral cavity.

The elevation of the tumor in the intestinal tract does not in any way limit the indications for extirpation. Operations upon carcinoma of the rectum, involving the uterine or genito-urinary organs, are only justifiable upon the demand of the invalid. The patient has the right to take a desperate chance for his life, but it is not right for the surgeon to induce him to undertake this chance against his will, for the probability in such cases is a fatal termination.

The Choice of Method.—No one method of procedure is applicable to all cases of carcinoma of the rectum and sigmoid. The method to be pursued in any individual case will depend upon the location and extent of the tumor, the patient's physical condition, and, finally, upon the average results from the different operations. It is customary in discussing the choice of operations to divide the rectum into four or five sections, indefinitely described as anal, subampullary, ampullary, recto-sigmoidal, and sigmoidal. Practically there are but three divisions

—the infraperitoneal, the supraperitoneal, and the sigmoidal. All operable carcinomas below the peritoneal *cul-de-sac* demand a practical amputation of the lower end of the gut, with or without removal of the sphincters. Where the growth is limited to this lower portion, there is no longer any question as to choice of operation. The perineal method should be invariably adopted on account of its low mortality and the comparative absence of shock which follows it. Unquestionably there is more hæmorrhage by this method, and it is more frequently followed by an ulcerative area at the lower end of the rectum; but inasmuch as free drainage is afforded through the anus, fatalities from sepsis are comparatively rare. The modified method of Quénu is a large step in advance of any other technique for perineal extirpation, and if it is carefully conducted the immediate mortality ought not to be above 10 per cent. This operation, as Quénu has pointed out, is applicable to tumors much higher up, but it is not so satisfactory as the sacro-coccygeal route in tumors located above the peritoneal reflection—that is, more than 3 inches from the anus.

In tumors confined to the rectum proper—that is, below the third sacral vertebra and removed more than 1 inch from the upper border of the internal sphincter—the sacral method of approach, especially the Rehn-Rydygier bone-flap operation, is preferable. In an experience of over 20 cases by this method, the author has not seen one in which survival after the operation was not followed by comparatively good restoration of the bony floor of the pelvis. He is decidedly in favor of suturing the bone back in position, leaving the horizontal portion of the wound open for drainage. In many cases excision of the coccyx gives all the room necessary for extirpation, but one can never tell beforehand whether it will or not; therefore it is better to adopt the bone-flap operation in the first place. It is rapid, effectual, and by it any growth of the rectum or lower sigmoid can be removed.

For tumors situated above the recto-sigmoidal juncture, the abdominal method, first suggested by Kelly, seems to give excellent results. Wherever the superior limits of the growth can not be reached by the finger through the anus, abdominal exploration should always be employed; and under these circumstances it is wise to complete the operation by this route at the time, if feasible, or at least to establish an artificial anus preliminary to subsequent extirpation by the perineal or sacral route. If during such an exploration the growth is determined to be of a recto-sigmoidal nature, and the patient's condition justifies the same, one may proceed by the combined method, adopting Weir's modification of Maunsell's operation or the modified technique of Quénu. If the patient is feeble, and there is an accumulation of hard fæcal masses above the neoplasm at the time of such an exploration, one should not

attempt to extirpate the tumor until this accumulation has been relieved through the establishment of an artificial inguinal anus. The preference of the French, and some American surgeons, for a permanent inguinal anus in all carcinomas of the rectum is not shared by the writer. Just as good and permanent results can be obtained through the reestablishment of the normal exit to the intestinal canal where the limits of the growth admit of the resected ends being brought in apposition. The mental effect of the artificial anus upon these patients is distinctly unfortunate. It is true that by the modern methods one can establish a comparatively continent inguinal anus; at the same time this abnormality in sensitive patients is always a great source of annoyance and depression. Where, however, upon abdominal exploration it is clear that restoration of the intestinal canal can not be safely made, one should not hesitate to establish a permanent inguinal anus at once. The establishment of an artificial anus as a preliminary to extirpation of the rectum is undoubtedly a safeguard to the procedure; it enables one to obtain by irrigation through the lower end of the inguinal anus a more healthy and less septic condition of the intestinal canal below; it obviates the danger of soiling the operative field during the operation, and also that of faecal extravasation should the sutures give way subsequent to the union of the ends of the intestine. At the same time, where the growth is low down and it is possible to bring the superior segment well below the peritoneal reflection or out through the anus, one may avoid the necessity of colotomy and subsequent closure with comparative safety. However, in patients who are already septic and feeble, one should take no chances in attempting extirpation without the preliminary anus.

Finally, the choice of method in such cases should be influenced very largely by the probable results of each as derived from the observation of a large number of cases. The following table, gathered from a collection of 1,578 cases of extirpation of the rectum and sigmoid, indicates in a very positive manner the probable results which may be expected from each procedure:

Table

Метод.	Number of cases.	Deaths.	Mortality.
Sacral	913	211	23.1 per cent.
Perineal	569	76	13.5 "
Abdominal	49	18	36.7 "
Combined	22	9	40.9 "
Vaginal	23	3	14.3 "
Anal	2	2	100 "
Total	1,578	319	20.2 per cent.

From these statistics one is forced to the conclusion that, where the location and extent of the neoplasm warrant it, the perineal operation

should be the method of choice. In women the vaginal method would seem to have many advantages, but in a closer examination of the statistics the curious fact appears that in them the abdominal and combined operations have given almost as low a mortality as the vaginal. In 18 cases of the abdominal and combined operations in women there were 3 deaths. For some unknown reason they appear to stand peritoneal invasion better than men. In Quénu's collection of 16 cases operated upon by the combined method, there were 8 women and 8 men. Of the 8 women, 7 recovered and 1 died; of the men, 7 died and 1 recovered, notwithstanding the fact that there appeared to be no great disparity in the gravity of the cases before operation. From these experiences one must be discouraged from the application of the abdominal or combined methods in men, whereas the results in women are comparatively satisfactory.

In small isolated epitheliomas or villous tumors in the lower end of the anus, one of two methods may be employed. The anus may be split posteriorly and the growth excised, if it be low enough down to be reached by this method. The edges of the wound from which the tumor is removed should be carefully sutured together, but the posterior anal incision should be left open in order to secure perfect drainage from the parts. Where the growth is too high up to be reached and manipulated in this way, one may approach it by the sacro-coccygeal route, open the intestine posteriorly, excise the tumor, and close the wounds in the gut. The superficial portion of the wound through the skin and cellular tissue, however, should be left open for drainage in case infection and sepsis should occur. The author has little sympathy with either of these operations. In his experience limited excision of carcinomatous growths has always been followed by a rapid recurrence either necessitating secondary operation or ending fatally before any relief could be rendered. Wide extirpation of all malignant growths is advisable when feasible; otherwise palliative treatment, as has been described above, must be employed.

The author's experience with colotomy in these cases has been singularly unfortunate. In only one instance of 20 operations done by himself, and many others seen after operation by others, has the life of the patient been prolonged more than twelve months. In a number of cases in which no operative interference has been employed, he has seen the patient survive from one to three years in comparative comfort through the persistent application of palliative methods. He therefore believes that in the large majority of inoperable cases just as much comfort and prolongation of life can be obtained by these methods as by the establishment of an artificial anus.

CHAPTER XXI

COLOSTOMY—COLOTOMY—ARTIFICIAL ANUS

THE old term *colotomy* has in recent years been superseded by the term *colostomy*, which more properly describes an artificial anus or opening in the colon, being derived from the two Greek words *κῶλον*, colon, and *στόμα*, a mouth or aperture. When the artificial opening is made in the small intestine it is spoken of as enterostomy. Petit, to whom we are indebted for the term colostomy, suggested (*Union médicale*, 1886, p. 577) that its application be limited to permanent artificial anus, and the word colotomy should be employed to describe the temporary variety. Aside from the fact that there is no warrant in etymology for such a distinction, it would be very confusing, for the term colotomy has been employed in medical literature for the past two centuries to describe artificial ani both temporary and permanent. In this work, therefore, the two terms are used as synonyms, and the qualifying adjectives *temporary* and *permanent* are employed as the occasion may require.

Fortunately there are very few conditions in which a permanent artificial anus is required. Temporary colostomy, however, is employed more and more frequently in the treatment of inflammatory conditions of the rectum, sigmoid, and colon, as a preliminary operation to extirpations and resections of the lower end of the intestinal canal, in imperforate ani, in complicated fistulas between the intestine and urinary organs, in certain types of prolapse, and in strictures of the sigmoid flexure. The permanent artificial anus is employed in inoperable strictures and neoplasms of the intestinal tract, in cases in which it is impossible to reestablish the intestinal canal after resection of the diseased portions, and where the sphincters and entire anus have been removed in amputating the rectum for malignant disease. Some surgeons prefer to establish a permanent artificial anus in all cases of malignant disease of the sigmoid and rectum whether extirpation is done or not. The author has expressed his disapproval of this course. As a temporary measure, however, to divert the fecal current during extensive operations upon the intestine below, or in the treatment of conditions heretofore mentioned, there is no more beneficent or useful

procedure. This side-tracking of the faecal current was first suggested by Pollosson (Lyon méd., 1884, t. xlv, pp. 67-75), and put into practical application by Schede in 1887 (Deutsche med. Wochenschr., Leipz. u. Berl., 1887, Bd. xiii, S. 1048); it marks the dividing line between temporary and permanent colostomy. Up to this time all artificial ani had been made with the view to establish a permanent exit for the intestinal contents, and every surgical effort was exerted to make this outlet effectual so as to prevent the escape of faecal matter into the gut below, and at the same time to obtain, if possible, a certain amount of sphincteric control.

Since then, however, surgeons have realized the fact that when the artificial anus has served its purpose and the condition for which it was made has disappeared, it is desirable to close the aperture, and to do so with as little danger to the patient as possible. The trend of surgical experiments in this line, therefore, has been to establish a method for temporary colostomy which will be effectual as long as it is necessary, and in which the aperture can be closed when advisable without any particular danger to the patient.

In the older operations the closure of the artificial anus necessitated enterotomy or resection of that portion of the colon or sigmoid involved in making the colostomy. This procedure, as is well known, proved to be more fatal than the original operation; therefore most surgeons hesitated to recommend colostomy except in incurable conditions. Happily it has been demonstrated recently that a temporary colostomy may be made in such a manner that the artificial anus can be closed when it has survived its usefulness without opening the peritoneal cavity or resecting any portion of the gut. This fact has widened the field of usefulness of the operation, induced surgeons to employ it, and made patients willing to submit to its inconveniences for a time through the assurance that the normal channel could be restored whenever the condition of the parts below warranted it.

In works on general surgery two types of colostomy are described—the lumbar and the inguinal. The term *abdominal* is preferable to *inguinal* because the artificial anus is frequently made elsewhere than in the inguinal region, as, for example, in the operations of Finet and Witzel, and in colostomy in the ascending colon.

Lumbar colostomy is almost an obsolete operation. It was originally advocated upon the ground that the colon could be reached from behind without invasion of the peritoneal cavity. Before the days of aseptic surgery this was a great desideratum, and in the cases in which it was possible no doubt contributed largely to the low mortality in this operation. It has been proved by Allingham (*op. cit.*, p. 421) that in the majority of cases it is impossible to open the colon through this route

without wounding the peritonæum. In certain instances in which there is no mesentery it can be done; in others in which the mesentery is short its folds may be separated and the gut reached without actually penetrating the peritoneal cavity, but this is a very difficult procedure; while in those with long mesenteries it is quite as impossible to reach the colon through the lumbar incision as through the abdominal without invading the peritoneal cavity. The difficulties of the operation, the fact that the anus was inconveniently placed for the exercise of proper care without assistance, the peculiar complications which one was accustomed to meet with on account of displacements of the colon, and abnormalities in the kidney or ureter, and the almost insuperable obstacles to closure of the artificial anus made by this operation, were recognized by surgeons in general, but these were thought to be compensated for by avoidance of injury to the peritonæum. This dread of entering the peritoneal cavity, sometimes described as "*false*," was only too well founded in the days of Amussat, Callisen, and their followers. With the advent of aseptic surgery, however, it has disappeared, and with it the operation of lumbar colostomy has almost been discarded from surgical practice. It is an operation still useful, however, in certain conditions, such as incurable diseases of the sigmoid and descending colon, in which the ordinary inguinal anus would be below the site of the disease, and also in cases of great distention of the intestines, for in such cases it is sometimes easier to find the colon by this route than by abdominal incision. It is an operation which will always have a certain field of usefulness, and therefore merits description.

It has been claimed that the mortality from this operation is less than that from inguinal colotomy. Before describing the methods, therefore, let us look into this phase of the subject and determine somewhat definitely what are the chances of death in these two operations.

Mortality from Colostomy.—In discussing this question one must not confound the mortality from operation with that from the disease for which the operation is done. Many patients in whom colostomy has been performed have been *in extremis* at the time of operation, and have died from the disease and not from the surgical procedure. Bryant, therefore, in discussing the mortality in lumbar colotomy, divides his cases into urgent and non-urgent ones. Of the former he tabulates 100 cases, of which 45 died within one month. He does not give the cause of death, nor does he state in how many it could be attributed to the operation. But when it is recalled that 45 per cent died within one month, it is fair to presume that the immediate mortality was not inconsiderable. Of the 70 non-urgent cases which he reports, none died within the first month. There can be no more forcible argument in

favor of early colostomy in malignant disease than these figures of the great English surgeon. This record is the more remarkable from the fact that many of the operations were done with the crudest aseptic precautions.

Croley (Transactions of the Academy of Medicine, Ireland, 1896, p. 147) has reported 18 cases of lumbar colotomy with no deaths, the patients all living from a few months to over two years after operation. On the other hand, Wheeler (*ibid.*, p. 133) estimated the mortality from this operation in urgent and non-urgent cases at 25 per cent. His statistics, however, were drawn from the compilations of Batt and others made before the days of aseptic surgery. The lumbar operation is so seldom performed at the present day that it is almost impossible to give any definite figures with regard to its mortality under modern surgical precautions; but from the figures which the author has been able to obtain, it is estimated that the death-rate in a consecutive number of cases, as they come, will not fall short of 12 per cent.

In inguinal colostomy it is much easier to arrive at some conclusion with regard to the mortality. Kelsey says: "Given 100 cases seen early and in good condition, it would be easy to escape any mortality from the operation whatever. On the other hand, taking the same number of cases as they present themselves from time to time, there would probably be a considerable death-rate." The statistics of Batt (Amer. Jour. Med. Science, October, 1884, p. 423), in which a mortality of 31.8 per cent for lumbar and 53.1 per cent for inguinal colostomy is given, must be ignored at the present day. These figures were drawn from operations done before the advent of aseptic surgery, and at times when the procedure was so unfavorably considered by surgeons that it was put off until the patients were practically moribund. They do not represent in any way the results from either of these operations at the present time. Under modern aseptic precautions, and in the hands of competent operators, inguinal colotomy is followed by a comparatively low mortality. The following table illustrates this fact most forcibly:

Table

OPERATOR.	Number of cases.	Deaths.
Allingham.....	68	2
Reeves.....	65	0
Cripps.....	27	1
Wheeler.....	9	1
Edwards.....	16	1
Goodsall.....	22	0
Author.....	24	1
Miscellaneous.....	24	2
Total.....	255	8

In this list we have 255 cases with 8 deaths, a mortality of 3.1 per cent.

It is reasonable to suppose that the average run of cases subjected to the abdominal operation are equally as grave as those in which the lumbar method is employed, and, assuming such to be the case, it appears very clear that the figures are greatly in favor of inguinal colostomy. Nevertheless the operation is not without its hazard, and it should not be undertaken without a due appreciation thereof and a frank statement of the possibilities in the case to the patient and his friends. It is an operation that requires good judgment to determine its necessity, an accurate knowledge of the parts involved, and a most delicate manipulative skill in its performance. As Mathews says, too many men attempt it who are inexperienced in surgical technique, and without mature judgment in the selection of cases.

In emergency cases, such as complete obstruction, delay in obtaining the services of an expert surgeon will often jeopardize the patient's life. It is necessary, therefore, that every practitioner should be prepared to perform this operation upon a moment's notice. A certain number of fatalities will, of course, result from inexperience or lack of aseptic surroundings, but this number will be more than counterbalanced by the lives saved which would otherwise be lost through delay or transporting the patient to a hospital.

In operations of election, however, especially where temporary colotomy is proposed, there is little excuse for any fatalities. Accidents have occurred in this operation resulting in death several days afterward, but it would appear that these were all avoidable. Were this not the case one would hesitate to advise the operation in such conditions as mucous colitis, rectal ulceration, and complicated fistula, for these conditions, while annoying, are not usually fatal.

The conclusions in regard to the mortality from abdominal colostomy are deduced from the statistics of expert operators. The figures do not represent accurately the results of all colostomies done everywhere, but they do represent what can be accomplished by those perfectly familiar with the method.

Lumbar Colostomy.—This procedure, generally known as Amussat's operation, was first proposed by Callisen in 1796, who employed a perpendicular incision just in front of the left quadratus lumborum muscle. Amussat modified the operation by making a transverse incision in the loin, and extended its application to the colon on the right side. Sir Thomas Bryant further modified the operation by employing an oblique incision just below the border of the floating ribs, thus reaching the colon at a higher level than was attempted by Callisen or Amussat. In all these operations the lumbar muscles were incised, but recently

operators have been accustomed to separate them by blunt dissection instead of cutting, after the manner advised by Howse. The method of Bryant, who has had the largest experience in this operation, is as follows:

The patient is laid upon the opposite side from which the colostomy is to be done, and a firm pillow or sand-bag is placed under the loin in order to make the flank prominent, and being turned somewhat upon



FIG. 300.—LINE OF INCISION IN LUMBAR COLOSTOMY. (Bryant.)

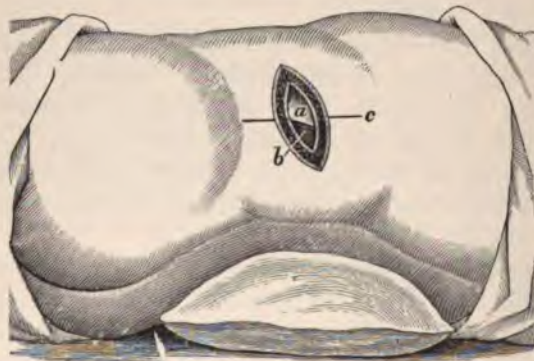


FIG. 301.—LUMBAR COLOSTOMY. (Bryant.)

Transversalis fascia incised and subserous fat pushed aside, exposing colon above and quadratus-lumborum muscle below.

his face, the anterior border of the quadratus lumborum can be distinctly felt. An incision is made just below the border of the last rib (Fig. 300), beginning an inch and a half back of the anterior superior spine, and extending downward and forward parallel with the crest of the ilium for about 5 inches. Having incised the skin and cellular tissue, one should separate the fibers of the external oblique and latissimus dorsi muscles, holding them apart with broad retractors; below these one comes upon the internal oblique muscle, which should be separated in like manner by dull dissection, thus exposing the lumbar fascia, the fibers of which

run transversely and may be separated or cut. The external border of the quadratus lumborum will thus be exposed, together with the transversalis fascia. At this point one should stop and ligate all bleeding vessels in order to get rid of any hæmostatic forceps in the wound. With broad retractors holding the tissues apart (Fig. 301), the transversalis fascia is freely incised, and beneath it one enters the bed of subserous fat in which the kidney is embedded and in front of which

lies the colon. This fat should be cautiously torn apart by the fingers or a blunt instrument in order to avoid wounding the kidney or ureter, which are sometimes abnormally placed. The kidney should be located during this blunt dissection, as, according to Bryant, the colon always lies just in front of its lower border. In some cases in which there is a small amount of fat, or when the colon is greatly distended, the latter will come into view upon incising the transversalis fascia. In other cases, where the fat is abundant and the gut collapsed, it is quite difficult to find the colon. It is usually searched for too far away from the spine. It is sometimes said that the longitudinal fibers of the gut and appendices epiploicæ can be seen at this point, thus distinguishing the colon from the small intestine; but Allingham has shown this to be impossible unless the peritoneal cavity is opened. All that one needs to guide him is the fact that if any gut at all is reached without entering the peritoneal cavity, it must be the colon. Whether the latter can be reached without entering the peritoneal cavity or not depends upon the length of the mesentery.

Assuming that the latter is short, the next step in the operation consists in rolling the gut slightly forward and then passing a silk ligature through the skin, then through the gut, embracing about $\frac{1}{3}$ of its circumference, and even through the skin on the opposite side of the wound. The gut is now incised longitudinally, and the loops of the sutures passed through it are caught, drawn out through the wound, and cut in the middle; the ends are then tied to those passed through the skin on their respective sides. In order to avoid soiling the wound with escaping fæces, the gut should be caught with forceps and dragged outside, if possible, gauze being packed on each side of it before the intestinal incision is made. The packing should be kept in place until the first gush of fæces and gas has subsided; then the canal should be packed with gauze to prevent any further escape, the parts washed with sterilized solution, the gauze packing around the gut removed, and the edges of the skin and intestinal wounds should be sutured together by close interrupted silk sutures. Sometimes there is no fæcal discharge at all for days after the operation.



FIG. 302.—LUMBAR COLOSTOMY COMPLETED. (Bryant.)

In cases of distention, failure of gas to escape would indicate that the opening had been made below the point of obstruction, and that the operation would be of no avail.

After the gut has been fixed in position (Fig. 302), the gauze is removed from the canal and the parts are smeared with sterilized vaseline or cerate in order to prevent the faeces irritating the skin and the dressings sticking to the edges of the wound. The latter is then dressed with dry, fluffy gauze covered by rubber protective held in position by a firm abdominal binder or adhesive plaster. The patient is placed on his back in bed, and a sufficient amount of morphine is administered hypodermically to overcome nausea; otherwise no opiate should be administered, as it retards the peristaltic action of the intestine and prevents the restoration of tone in the bowels which have been overdistended and partially paralyzed. The stitches should be removed about the sixth day and the patient allowed to sit up at the end of ten days or two weeks.

As will be seen, no effort is made at first to establish a spur which will prevent the escape of faecal matter into the lower segment of the bowel. Several methods have been devised to accomplish this. One of these consists in drawing the deep wall of the gut out through the opening in the exposed portion, dissecting off the mucous membrane around the lower opening thus formed, and suturing the freshened surfaces together, thus absolutely occluding the inferior segment of the gut. A simpler method consists in pulling the posterior wall forward and passing a wire suture through the skin, underneath the gut and out through the skin on the opposite side; the wire being drawn taut and fastened by shields on either end thus holds the gut well out of the wound and produces a very effectual spur.

In cases where on account of a long mesentery the colon can not be reached without entering the peritoneal cavity, it should be drawn out of the lumbar wound and fixed by sutures or a supporting rod passed from one side of the wound to the other. In these cases some hours should elapse before the intestine is opened, if the condition of the patient will allow. Where there is very great distention, however, the gut may be packed around with absorbent gauze, and a trocar introduced to allow the escape of gases. After this has been accomplished, the wound made by the trocar should be closed with Lembert sutures, the gut fixed in position, and opened at a later period.

Inguinal or Abdominal Colostomy.—It is now nearly two hundred years since Littre (*Mémoire de l'académie des sciences*, Paris, vol. x, p. 36) first proposed to make an artificial anus by an incision in the abdomen ("au ventre"). His advice was to open the sigmoid flexure for the relief of obstruction below. He laid no particular stress upon the point of incision, and does not appear to have done the operation

upon a living subject. Pillore, of Rouen, first made an inguinal anus for complete obstruction due to cancer of the rectum in 1776 (*Brit. and For. Med. Review*, xviii, p. 452). In this case the opening was made in the cæcum upon the right side, and the patient lived twenty-eight days, finally dying from causes not due to the operation. Following him, Duboise performed the operation in 1783 for imperforate anus, the child dying in ten days; ten years later Dinet (*Med. opér. sabatier*, ii, p. 336) attempted the procedure for a like cause in a child two days old. This patient lived many years. In 1794 Desault operated in a similar case, but without success. Thus in the first four operations by the abdominal method, three were done for imperforate ani and one for intestinal obstruction, with a mortality of 50 per cent.

Shortly after this Fine, of Geneva (*Manuel de méd. pratique de Louis Adier de Genève*, second edit., 1811), made an artificial anus in the transverse colon by an incision through the rectus muscle just above the umbilicus. Following these, Martland, in 1814 (*Edinburgh Medical and Surgical Jour.*, 1825, p. 271), Freer in 1817, and Pring in 1820 (*London Med. and Physical Jour.*, 1821) performed the operation, making the anus in the sigmoid flexure. Up to this time no effort or suggestion had been made to avoid wounding the peritonæum. Callisen does not even seem to have thought of this when he proposed the left lumbar operation, "because," as he says, "the intestine may be reached more easily in this place than above in the iliac region." Nevertheless, the fear of wounding the peritonæum grew, and when Amussat demonstrated that he could open the colon from behind without entering the peritoneal cavity, and substantiated his claim by reporting 6 cases with 1 death (*Gaz. méd. de Paris*, 1839, No. 1), the results were so remarkable that the Littre operation immediately fell into disuse and became practically obsolete for the next half century.

Since it has been demonstrated, however, that the peritoneal cavity can be opened with comparatively little danger under aseptic precautions, the tables have been turned, and the inguinal or abdominal operation is now almost universally employed. The advantages which it offers are: First, it is more easily and quickly performed; second, there is less danger of infection and inflammation in the wound because it is shallower; third, it furnishes an opportunity for abdominal exploration which is of the greatest importance in all cases in which an artificial anus is necessary; fourth, the site at which the anus is placed makes it more convenient and comfortable to the patient; fifth, the difficulties of closure are much less than when the artificial anus is in the lumbar region; sixth, the mortality is lower in this method than in lumbar colostomy. For these reasons this method should be employed except in the rare instances mentioned above.

Until within a few years, inguinal colostomy was employed only to overcome or prevent intestinal obstruction. Recently it has been adopted generally as a means of treatment in various conditions, and as a preliminary measure to extensive operations upon the lower portions of the intestinal canal. It is also being done much earlier and more frequently in inoperable cases of malignant disease of the rectum and sigmoid, since it has been shown by Witzel, Bailey, Weir, and others that the artificial anus can be so fashioned that the patient is comparatively safe from involuntary faecal discharges. There are therefore two distinct classes in which it is employed: First, *cases in which the disease is curable by treatment or surgical procedure, and in which it is possible to reestablish the normal faecal canal*; second, *cases in which the disease is incurable, or in which, the diseased portion being removed, it is impossible to reestablish the normal canal*.

In the first class, when an artificial anus is determined upon, it is important that it should be made in such a manner that it can be eventually closed with the least possible disturbance and danger to the patient. In the second class the anus should be so fashioned that it can be easily attended to and will possess the greatest amount of faecal control. In the early application of this operation, when it was only performed for incurable conditions, the chief effort of surgeons was to produce an artificial anus which would be an effectual exit for faecal material and prevent its escape into the lower or diseased segment of the gut. All devices and improvements in the operation during this period were directed toward the formation of an acute, elevated spur between the two legs of the loop in which the anus was made, and toward the prevention of prolapse. The methods of Allingham, Cripps, Kelsey, Bodine, Maydl, and Reclus were all directed toward these ends. On the other hand, the methods of Witzel, Bailey, Paul, and Weir are all directed toward the formation of a permanent artificial anus that will possess the greatest amount of continence, and in the most convenient position for the patient. The former are adapted to temporary, the latter to permanent, colostomy. The discussion of this subject, therefore, naturally divides itself into that of the temporary and permanent methods.

Temporary Colostomy.—The temporary artificial anus consists in an opening made in the intestine at some point above the seat of disease for the purpose of turning aside the faecal current while local treatment or some operative procedure is being carried out upon the parts below. The site at which this opening is made depends upon the location of the disease and the treatment which is to be adopted. If the latter is to be local medication, the artificial anus should be placed as close to the diseased area as is consistent with its establishment in healthy tissue; if operative procedures are to follow, it should be placed sufficiently far

away to allow the greatest freedom to the surgeon in dealing with the healthy segment of the gut between it and the diseased portion. In other words, if there is a tumor or stricture to be removed, the artificial anus should be so placed that it will not interfere with the manual performance of the operation, and that there will remain sufficient healthy intestine below it through which to reestablish the normal faecal canal if such is possible. Thus, in some cases, it is advisable to make the artificial anus in the lower portion of the sigmoid, in some in the upper portion, and in still others in the transverse or ascending colon.

The essentials of a temporary artificial anus are, a free exit for faecal matter, absolute prevention of its escape into the gut below, and facility of closure after its purposes have been served. The latter is of the utmost importance, for if the closure of the temporary anus is more dangerous than the operation of making it, or even than that for which it is made a preliminary procedure, it could hardly be recommended to patients with much confidence. It is necessary, therefore, in making such an anus to have clearly in view its ultimate closure, and so make it that this may be comparatively sure, and as far as possible free from danger to life.

The Operation.—There are several different techniques employed in the performance of this operation. Some were devised especially to form an effectual spur, others to prevent prolapse, and still others with a view to ultimate closure.

The preparation of the patient, the incision and the opening of the abdomen are practically the same in all, and need be described but once. The patient should be prepared as for laparotomy; the pubes should be shaved, the abdomen scrubbed with green soap and dressed with bichloride gauze the night before the operation. The bowels should be moved by a laxative the day previous, and by an enema on the day of the procedure. These preparations will be impossible in emergency cases, and in such one must content himself with the best immediate aseptic preparations possible. After the patient is anaesthetized, the abdomen should be thoroughly scrubbed with tincture of green soap, then with a solution of bichloride (1 to 2,000), and finally with alcohol 95 per cent. This simple aseptic preparation, if thoroughly carried out, is as effectual as the most complicated methods. In 350 aseptic cases in which it was employed in the Almshouse and Workhouse hospitals in the years 1898 and 1899, only 3 cases of infection occurred—one due to escape of urine into the wound, one to the use of old catgut by mistake, and the third to the patient's having got out of bed and disarranged the dressings a few hours after the operation. With such an experience, the author is convinced that no more elaborate preparation of the patient is necessary.

The abdomen having been thus prepared, is covered with sterilized towels or sheets except at the immediate operative field. If the artificial anus is to be made in the left inguinal region, an incision should be made through the skin in a line with the fibers of the external oblique



FIG. 303.—INCISION IN INGUINAL COLOSTOMY.

Skin and subcutaneous fat drawn aside, exposing external oblique muscle.

muscle; it should begin 1 inch above and $1\frac{1}{2}$ inch inside of the anterior superior spine; its length should be $2\frac{1}{2}$ to 3 inches or longer in fat people, and it should be carried through the skin and superficial fascia to the fibers of the external oblique muscle (Fig. 303). Some operators divide the entire wall of the abdomen by clean incision. It is preferable, however, to separate the fibers of the muscles in each layer by dull instruments, dragging them apart with retractors, and thus preserving their functional action. By this method the external oblique is first

separated in one line, the internal oblique in another, and the fascia transversalis then comes into view (Fig. 304). At this point one should tie all bleeding vessels, and thoroughly dry the wound in order to prevent any oozing of blood into the peritoneal cavity. The fascia transversalis is then incised in a line with Poupart's ligament to the extent of about 2 inches; this brings the peritonæum into view, and it should be incised in the same line, its edges being caught by artery clamps and drawn up through the wound to prevent its being stripped off from the abdominal wall during the examination. The patient should then be placed in the Trendelenburg posture in order to free the pelvis, if possible, from the loops of small intestine and omentum.

The incision should be made large enough to permit the introduction of the hand, so that it will be possible to explore carefully the

pelvic and abdominal cavities before attempting to find the sigmoid. One can never say exactly at what point the artificial anus should be made until such an exploration has been carried out. Even in cases with great distention this examination is of the utmost importance, because it enables one sometimes to find the collapsed portion of the gut below the obstruction, and thus determine the exact site of the latter. After this exploration has been made, with the hand well down in the pelvis, one may trace the rectum upward, and thus without any difficulty secure the lower loop of the sigmoid flexure and drag it out of the wound, being absolutely certain as to which is the superior and which is the inferior segment. The sigmoid and colon are recognized by the longitudinal muscular bands and by the attachment of the appendices epiploicæ. While such extensive exploration adds to the possibility of peritonitis, this danger is more than compensated for by the exact knowledge which is acquired of the parts that are to be dealt with. Most operators advise introducing the forefinger through the abdominal wound, and searching for the sigmoid in the iliac fossa before exploring the abdomen, but this is not so satisfactory as exploration with the whole hand.

Fixation of the Gut.—After the sigmoid is found and it has been determined which part of it is to be fixed in the abdominal wound, the operation may proceed in several different ways.

Some surgeons suture the parietal peritonæum to the edges of the skin wound, holding that union between this and the peritoneal layer of the gut will be more rapid than that between the intestine and freshly cut surfaces. Reclus,

however, has shown that this is a useless waste of time, as it does not hasten union in the least, and produces a weaker adhesion of the gut to the abdominal walls. The author has verified this claim, and in his last 15 cases has not sutured these tissues together. The fixation of the gut in the wound and the method of opening it are the points on which operators essentially differ.



FIG. 304.—INGUINAL COLOSTOMY.

Exposure and separation of the internal oblique muscle.

Cripps's Method.—After the sigmoid has been found, it is dragged out of the wound until the upper segment is taut, the lower being pushed back in the abdomen; this is done in order to prevent subsequent prolapse. In the loop thus brought out of the wound two provisional ligatures are passed through the longitudinal muscular band opposite the mesentery. The ends of these ligatures are left long, and are used to steady the bowel during its subsequent stitching to the abdominal wall; they also act as guides in opening the intestine. The loop is now dropped

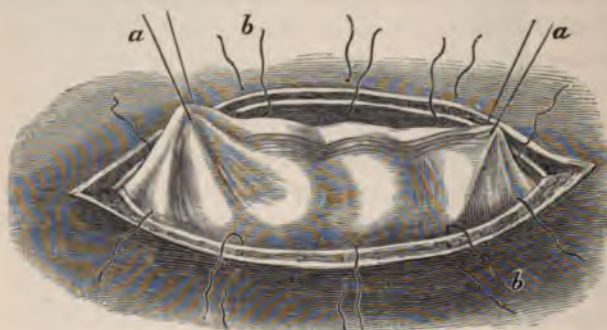


FIG. 305.—INGUINAL COLOSTOMY (Cripps's method).
a a, traction loops; b b, sutures meeting peritonæum and skin.



FIG. 306.—INGUINAL COLOSTOMY (Cripps's method).
Final sutures in place.

back in the abdomen while the parietal peritonæum is sutured to the skin; it is then drawn up into the wound again, and, while an assistant holds the long ligatures taut, it is fixed in position by 7 or 8 fine silk sutures, which pass through its peritoneal and muscular walls, and then through the edges of the peritonæum and skin (Fig. 305). The sutures at the angles of the wound pass first through the skin and peritonæum, then through the

peritoneal and muscular layers of the gut, and out through the peritonæum and skin upon the opposite side. The sutures in the gut are introduced in the longitudinal band on one side and along the border of the mesentery on the other; about two-thirds of the circumference of the gut is thus secured outside of the wound (Fig. 306). Unless the case is very urgent, the gut is not opened until several hours, or even two days, after the operation. The wound is dressed by being smeared with sterilized vaseline and covered with thin oiled silk

or rubber protective tissue, over which is placed a thick mass of gauze or cotton held in position by adhesive plaster or an abdominal bandage. The vaseline and rubber tissue prevent adhesion of the gut to the gauze dressings, so that they may be easily removed whenever it is thought wise to open the gut. When this period arrives, the gut is incised longitudinally between the two long ligatures which have been left in position, and its edges above the level of the skin are trimmed away.

Allingham's Method.—After the abdomen is opened the parietal peritonæum is sutured at once to the skin around the edges of the wound; the sigmoid is then found and dragged out of the abdomen until both the upper and lower legs of the loop are drawn taut. A suture of carbolized silk is then passed through the skin and peritonæum on the outer side of the wound, then through the mesentery, back again through the latter, and then tied to the end left outside of the skin. The mesentery is thus held in apposition with the parietal peritonæum, and all of the sigmoid which can be drawn through the abdominal wound is held outside of the abdomen. The edges of the wound are then sutured to the gut; the greater the distention the more sutures will be required to prevent hernia of the small intestines through the wound. The gut is not opened for some hours, or even three days if the symptoms are not urgent. It is then incised longitudinally, and after the bowels are once thoroughly emptied through this opening a specially devised clamp is applied which, being tightened daily, cuts off the entire loop left outside of the abdomen.

The special features of this operation consist in the production of a good spur and the removal of all that portion of the sigmoid which is likely to prolapse through the artificial anus. The sacrifice of this intestine seems altogether unnecessary. The pain produced by the slow cutting of the clamp is very trying to the patient, and, finally, the operation is not satisfactory in temporary colostomy on account of the amount of gut destroyed, and because it necessitates either enterotomy or intestinal resection to close it.

Kelsey fixes the sigmoid in the wound as follows: One end of a silver wire is prepared with a metal shield held on by a perforated shot, the other end, threaded to a strong, sharp needle, is passed through the entire abdominal wall about 1 inch to the right of the abdominal incision, then through the mesentery, and back through the abdominal wall on the opposite side from within outward. The wire is drawn taut, thus bringing the edges of the wound in close apposition with the mesentery, and the free end is fastened with a shield and shot as on the opposite side. He does not suture the peritonæum and skin together at first, but brings them together with interrupted silk sutures,

each passing through the skin, then through the parietal peritonæum, and then through the peritoneal and muscular coats of the intestine.

As will be observed from the cross-sections (Figs. 307, 308) of the preceding operations, the posterior wall of the gut is below the level of the skin, and it is impossible without sacrificing a considerable

portion of the gut to prevent the escape of a certain amount of fæcal material into the dependent segment.



FIG. 307.—CROSS-SECTION AFTER COLOSTOMY BY ALLINGHAM'S METHOD.

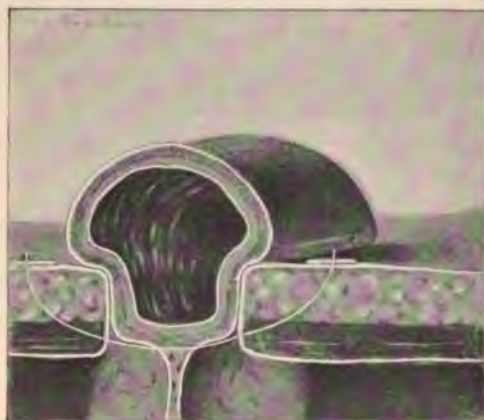


FIG. 308.—CROSS-SECTION AFTER COLOSTOMY BY KELSEY'S METHOD.

Bodine's Method.—A very effectual method of producing a spur is that proposed by J. A. Bodine, of New York. It consists in drawing a loop of the sigmoid well out of the wound and uniting its afferent and efferent legs to the extent of about 2 inches with fine silk sutures placed on either side of the mesentery about $\frac{1}{2}$ an inch apart. The acutely flexed knuckle is then sutured in the abdominal wound so that it stands well above the level of the skin (Fig. 309). After the gut has thoroughly united with the abdominal wound and thus sealed off the peritoneal cavity, this protruding knuckle is amputated, leaving a double-barreled aperture with a perpendicular division which ef-

fectually prevents the passage of fæcal material into the intestine below.

The originator claims that an artificial anus formed in this manner can be safely and surely closed by cutting away this spur through the aid of Grant's enterotome (Fig. 310), or even by incising it with straight scissors, inasmuch as the union between the two legs pre-

vents any danger of such an incision penetrating the peritoneal cavity. The proposition sounds practical, and it has been highly indorsed by many of our best surgeons. The author has never employed it, however, because it is believed that in the Maydl-Reclus method there is a simpler and surer means to accomplish the desired ends without the sacrifice of any portion of the gut.

Mathews employs long harelip pins passed through the abdominal walls and mesentery to support the gut (Fig. 311). Jeannel has advocated making an irregular incision in the skin, passing the transverse part of the flap through the mesentery, and suturing it back in its normal position, thus using it as a means of support for the gut. These methods, however, possess no advantages over those previously described, and the difficulty of thoroughly sterilizing the skin forms an insuperable objection to the method of Jeannel.

The Maydl-Reclus Method.—Maydl (Centralb. f. Chir., No. 24, 1888) suggested supporting the loop of intestine drawn out of the inguinal wound by an inflexible rod made of vulcanized rubber with flanges upon either end. The technique, as he first proposed it, consisted in drawing the loop out through the wound, making a small incision in the mesentery, care being exercised to avoid the blood-vessels, then passing the rod through this incision; two or three sutures were placed so as to hold the intestine together below the rod, and then, with the latter resting upon either side of the wound, the protruding portion of the gut was sutured to the skin and peritonæum. A cross-section after this operation shows that the posterior wall of the gut is above the level of the abdominal wall (Fig. 312), and thus forms a spur beyond which the faeces rarely pass.

With some modifications, this is the quickest, simplest, and most

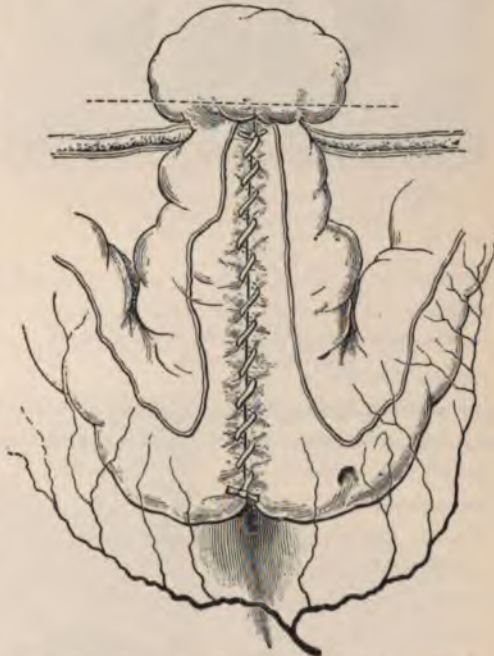


FIG. 309.—INGUINAL COLOSTOMY (Bodine's method).



FIG. 310.—ENTEROTOMY AFTER COLOSTOMY BY BODINE'S METHOD.

satisfactory method of colostomy. It is not only suitable for a temporary inguinal anus, but an artificial anus made by this method can be easily converted into the permanent type if it is found inadvisable to close the aperture.

Maydl and Reclus opened the gut by transverse incision in a line with the supporting rod and extending two-thirds around the circumference of the gut. This incision was made with a Paquelin cautery immediately after the gut was fixed in position or, if the case was not urgent, two or three days later. After two or three weeks the remainder of the circumference of the

gut was cut through upon the rod in a like manner, and the protruding ends were sutured to the skin around the wound. This treatment of

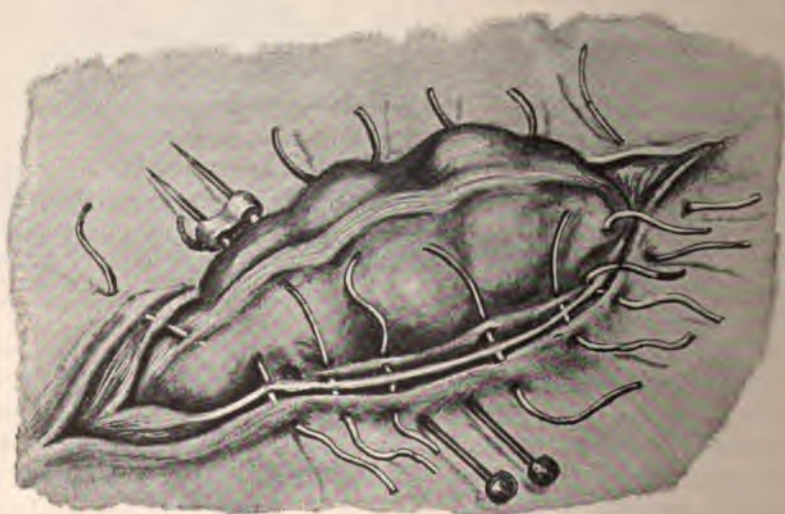


FIG. 311.—INGUINAL COLOSTOMY (Mathews's method).

the gut necessitates a resection of the bowel in case it is deemed wise to close the artificial anus at a later date, and therefore it is to be rejected.

The Author's Technique for Temporary Inguinal Colostomy.—

An incision through the skin and superficial fascia is made in a line with the fibers of the external oblique muscle, beginning at a point 1 inch above and $1\frac{1}{2}$ inch inside of the anterior superior spine of the ilium. It should be at least 3 inches in length. The fibers of the external and internal oblique are separated with a dull instru-

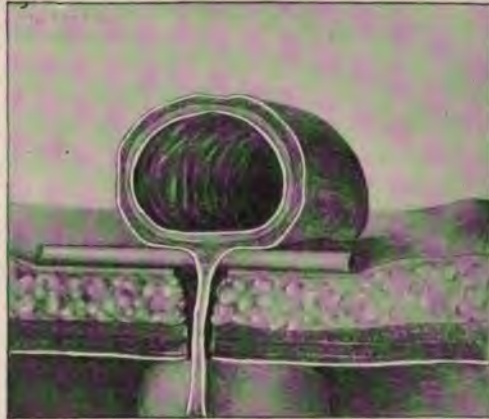


FIG. 312.—CROSS-SECTION AFTER COLOSTOMY BY MAYDL-RECLUS METHOD.

ment and drawn apart with broad retractors. The fascia transversalis is then divided by incision in the line of Poupart's ligament. At this point all bleeding vessels are ligatured and the wound thoroughly dried

with sterilized gauze.

The peritonæum is then opened by a small nick, the finger being introduced through this as a guide, and the membrane incised the whole length of the wound in the transversalis fascia; its edges are caught with hæmostatic forceps and drawn up into the wound. The hand of the operator is then introduced and a thorough exploration of the abdominal and

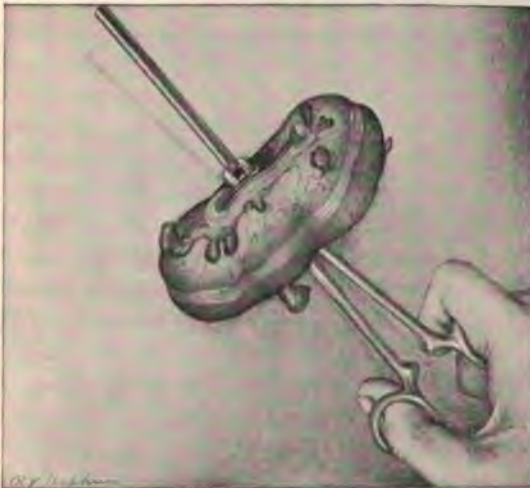


FIG. 313.—TEMPORARY INGUINAL COLOSTOMY.

Rod being passed through mesentery.

pelvic cavities is made. After this has been done, if it is found advisable to proceed with the temporary artificial anus, the sigmoid

is caught, dragged out of the wound, and the proper point to be utilized is determined upon. A small incision is then made through



FIG. 314.—TEMPORARY INGUINAL COLOSTOMY.
Gut supported on rod and sutures in position.

the mesentery, care being taken to avoid the blood-vessels, and a glass rod about $\frac{1}{4}$ of an inch in diameter and 4 inches in length is passed through this, its ends resting upon either side of the wound (Fig. 313). The lower angle of the wound is then closed by silkworm-gut sutures passed through all its coats to such an extent that it compresses the inferior leg of the intestinal loop against the glass rod. Fine chromicized catgut sutures are then passed at the two angles of the wound through the skin and peritonæum, then through the muscular wall of the gut, and back through the peritonæum and skin upon the opposite side (Fig. 314). Small pads of iodoform gauze are introduced under the protruding ends of the glass rod and along the edges of the wound close to the intestine after the latter has been smeared with sterilized vaseline. The whole is dressed with protective tissue covered by a thick pad of gauze or cotton, which is held in position by adhesive straps and a firm abdominal bandage. The gut is never opened at this time. If there is great distention by gas, a

the mesentery, care being taken to avoid the blood-vessels, and a glass rod about $\frac{1}{4}$ of an inch in diameter and 4 inches in length is passed through this, its ends resting upon either side of the wound (Fig. 313). The lower angle of the wound is then closed by silkworm-gut sutures passed through all its coats to such an extent that it compresses the inferior leg of the in-



FIG. 315.—INCISION FOR OPENING THE GUT IN
TEMPORARY INGUINAL COLOSTOMY.

trocar is inserted to allow its escape. After this has taken place, the opening made by the trocar is closed by two Lembert sutures and sealed with iodoformized collodion. The patient is placed in bed with his hips well elevated, and is given sufficient morphine hypodermically to control vomiting and intestinal peristalsis for the succeeding ten or twelve hours. The gut may be opened with perfect safety at any time after the first six hours, although it is better to wait two or three days in cases which will admit of such delay. This opening should be made by

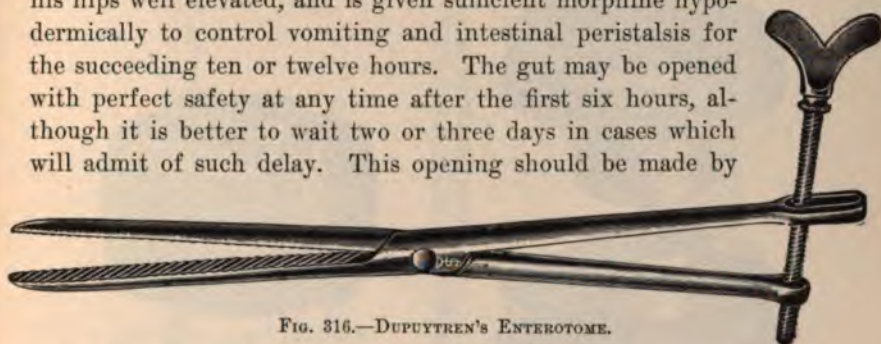


FIG. 316.—DEPUYTREN'S ENTEROTOME.

an incision through the longitudinal muscular band opposite the mesentery, extending from the superior angle of the wound to $\frac{1}{2}$ an inch below the supporting rod. A transverse incision is then made at the lower end



FIG. 317.—NÉLATON'S INTESTINAL CLAMP.

of this wound involving two-thirds of the circumference of the gut (Fig. 315). By this means the triangular flaps in the upper segment roll backward and curl up like dried leaves. The straight flap in the lower seg-



FIG. 318.—COLLINS'S LONG CLAMP FORCEPS.

ments falls downward and inward, practically closing the lower aperture. The faecal discharges are thus carried outside of the abdominal cavity, and there is scarcely any possibility of their escaping into the lower

segment. In addition to this, no portion of the intestinal wall is sacrificed, and when it becomes advisable the artificial anus can be closed by



FIG. 319.—MURPHY BUTTON OPEN.



FIG. 319A.—MURPHY BUTTON CLOSED.

simply suturing the edges of the T-shaped wound together without opening the peritoneal cavity. At the same time the lower segment may be opened by simply lifting up the transverse flap, thus furnishing an opportunity for irrigation and treatment of the parts below so long as is necessary.



FIG. 320.—SENN'S DECALCIFIED BONE-PLATE.

a, fixation sutures; *b*, approximation sutures; *c*, openings in plate and anchor thread.

In this operation the author adheres to the principle laid down in the foregoing pages with regard to the portion of the sigmoid in which the artificial anus ought to be made. If the disease is to be treated by resection of a portion of the gut below, the artificial anus is made high up in the sigmoid in order that as much as possible of this organ may be left below



FIG. 321.—LAPLACE'S FORCEPS FOR INTESTINAL RESECTION.

to be utilized in the reestablishment of the natural intestinal canal. The longer the loop thus left below the artificial anus, the easier will

be the subsequent operation of extirpation or resection. The glass rod is retained in position for two weeks, or even longer. It occasions the



FIG. 322.—O'HARA'S CLAMPS.

patient no inconvenience, and it is prevented from slipping out of place by a narrow strip of adhesive plaster around each end and fastened to the abdominal wall above the wound.



FIG. 323.—ISOLATION OF DISEASED PORTION OF GUT BY O'HARA'S METHOD.

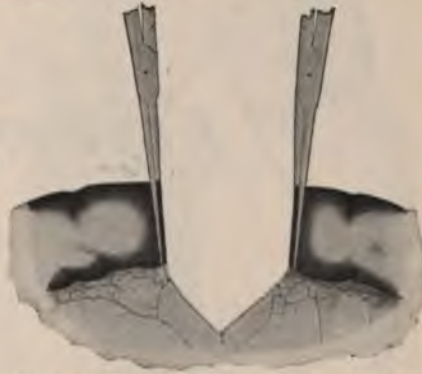


FIG. 324.—DISEASED PORTION EXCISED AND EDGES OF PERITONEUM BROUGHT TOGETHER (O'HARA).

If unexpectedly it becomes necessary to convert this temporary artificial anus into a permanent one, this can be accomplished by cutting through the posterior wall of the gut, which is supported upon the

rod, and trimming off the protruding edges to within about 1 centimeter ($\frac{2}{5}$ of an inch) of the skin. The opening of the intestine requires no anæsthesia whatever. Unless the cutting involves the mesentery,



FIG. 325.—SUTURES INTRODUCED OVER FORCEPS (O'Hara).



FIG. 326.—SUTURES TIED AND FORCEPS READY TO BE WITHDRAWN (O'Hara).

there is no pain connected with this part of the operation, and the hæmorrhage is always so slight that it need not give any anxiety. When the mesentery is incised, however, local or light general anæsthesia

ought to be employed, as the sensitive nerves of the gut seem to be located in this portion, and any cutting here occasions considerable pain. There is also likely to be considerable bleeding from this incision, which should be controlled by twisting or ligating the arteries.



FIG. 327.—GUT SEIZED FOR LATERAL ENTERO-ANASTOMOSIS BY O'HARA'S METHOD.

Closure of a Temporary Artificial Anus.—The method of closing an artificial anus will depend altogether upon the manner in which it has been made. In operations such

as Allingham's and Bodine's one may follow one of two plans: First, the spur may be cut away with an enterotome (Figs. 316, 317). A straight hysterectomy or long clamp forceps (Fig. 318) serves very well

for this purpose. The blades of the instrument are introduced one into the upper and the other into the lower aperture of the gut, and they are gradually tightened day by day until they cut their way through by necrosis of the tissues. This process is exceedingly painful to the patient, and it requires two to six days to accomplish it. After this the faecal current will generally pass downward through the rectum, and the artificial anus may heal spontaneously. If this does not occur, the edges of the gut around the abdominal opening may be dissected up from the skin and closed by Czerny-Lembert sutures, the skin being brought together above the freshened surfaces. It is perfectly evident that this method will result in a very abnormal condition of the intestine, nevertheless quite satisfactory results may be obtained through it.

The second method consists in dissecting the ends of the gut loose from their attachments to the abdominal wall, freshening their edges, and uniting them by end-to-end or lateral anastomosis. This may be done by the aid of the Murphy button (Fig. 319), Senn's bone-plates (Fig. 320), or by suturing with or without the use of the Laplace or O'Hara clamps (Figs. 321, 322). The latter instrument is a most ingenious and practical one. It not



FIG. 328.—LATERAL ENTERO-ANASTOMOSIS (second step in O'Hara's method).

only facilitates the suturing, but it at the same time controls hæmorrhage and prevents the escape of intestinal contents into the wound. The method of employing it has been graphically described by the inventor (*Amer. Jour. of Obstetrics*, vol. xlii, p. 82), and is easily understood from the accompanying illustrations (Figs. 323, 324, 325, 326, 327, 328). This operation involves opening the peritoneal cavity, and is, in fact, more dangerous than an ordinary resection of the gut, because it is difficult, without considerable sacrifice of the organ, to obtain portions which are completely covered with peritonæum. The various methods of resecting and reuniting the ends of the intestine are described in works on general surgery. An excel-

lent *résumé* of the technique will be found in Bryant's *Operative Surgery*, vol. ii, to which we are indebted for numerous illustrations.

After operations by the Cripps, Kelsey, or other methods, in which only a part of the intestinal circumference has been destroyed, the artificial anus may sometimes be successfully closed by a plastic operation, after the manner of Szymanowski's procedure for closure of urethro-perineal fistula. A curved incision, *ABC* (Fig. 330), is made through the skin internal to the artificial anus. This is dissected up for about 1 inch from the opening to the dotted line *ADC*. A second curved incision, *AEC*, is made on the opposite side, about $1\frac{1}{2}$ inch from



FIG. 329.—LATERAL ENTERO-ANASTOMOSIS COMPLETED (O'Hara's method).

the artificial anus. The superficial layer of the skin is dissected off from this flap with the exception of a small portion immediately surrounding the artificial anus sufficiently large to cover the latter aperture. The flap is then raised over the entire area, *AFCE*, leaving it well attached around the artificial anus. It is then folded over on this hinge-like attachment and sutured to the freshened surface from which the flap *ABCD* has been raised. To prevent their cutting into the skin, these sutures should be tied over pledgets of gauze. The flap *ABC* is

then dragged across and sutured to the margins of the incision *AEC* (Fig. 331). In this manner the artificial anus is closed by a double layer of skin without opening the peritoneal cavity. Parker Syms and others have succeeded in closing artificial ani after this manner.

When the colostomy has been done after the author's method, it may be closed as follows: The little triangular flaps in the upper segment, which curl up and become adherent in their peritoneal layers, are unrolled by carefully breaking up these adhesions with dull instruments or with the finger nail. Their edges are then freshened, together with that of the lower transverse flap. The T-shaped wound in the gut is then brought together by silk sutures passed through the mucous mem-

brane, after the manner of Czerny, and a row of Lembert sutures outside of these. After this has been accomplished, the gut is dissected loose from its attachment to the abdominal wall down to the peritoneal layer. This layer is carefully stripped from the abdominal wall to the extent of about 1 inch all around the artificial anus. This loosening provides a loop of peritonæum which allows the closed gut to drop down below the level of the abdominal wall (Fig. 332). The opening in the latter, already freshened by dissecting loose the intestine, is then brought together by silkworm-gut sutures passed through all its layers. By this method the gut is effectually closed with very slight, if any, diminution in its caliber, without opening the peritoneal cavity, and the abdominal wall is restored in all its thickness, which is a matter of considerable importance in the prevention of hernia.

Permanent Colostomy.—

The chief requisites of a permanent artificial anus consist in an effectual outlet for the faecal discharges, convenience in its management by the patient, the absence of prolapse, and the greatest possible faecal control. It is generally conceded that an artificial anus in the inguinal region can be better attended to by the patient himself than in the lumbar, gluteal, or sacral positions. It will also be admitted that prolapse is no more like-

ly to occur in this position than elsewhere. It may therefore be assumed that the inguinal site, when practicable, is the most satisfactory one. An effectual outlet for the faecal material can be easily obtained in any one of the positions mentioned. Control of faecal discharges is, therefore, the most important subject in connection with permanent colostomy. The constant escape of gas and faeces from artificial ani-

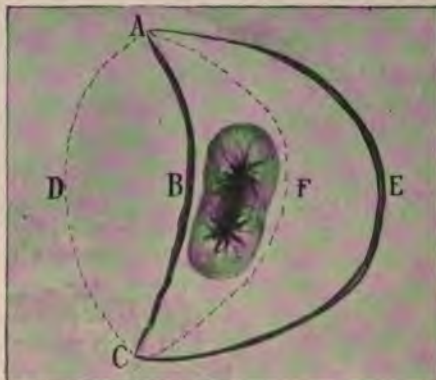


FIG. 330.—CLOSURE OF ARTIFICIAL ANUS BY PLASTIC METHOD.



FIG. 331.—CLOSURE OF ARTIFICIAL ANUS BY PLASTIC METHOD COMPLETED.

has brought the operation into disrepute with both patients and surgeons. The former are usually well satisfied for a time by the relief from pain and improvement in their general condition due to the regular

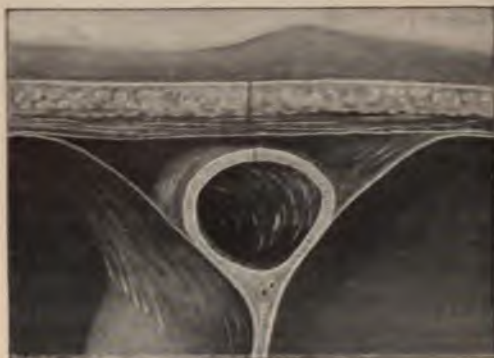


FIG. 332.—CROSS-SECTION AFTER EXTRA-PERITONEAL CLOSURE OF ARTIFICIAL ANUS.

action of their bowels through the newly formed exit; but when they learn that the opening is to be permanent; that they have no control over their passages; that they are debarred from society, business, and travel, and in addition to all this that the operation has not been curative, a dissatisfaction arises which ends in mental depression and sometimes in deep melancholy.

The mental condition of such patients is pitiable indeed. Therefore, when it is known beforehand that an artificial anus is to be a permanent affair, it should certainly be fashioned so as to give the patient the greatest possible control of the faecal discharges.

The greatest improvements in permanent colostomy have been along this line. Numerous ingenious mechanical appliances have been devised in the form of bags to catch the escaping faeces, and pads or plugs to obstruct the faecal exit. One of the best of these is the double inflatable bulb of Weir, a modification of Jacobson's intestinal plug. The two bulbs are connected by a hollow, hard-rubber tube for ease of introduction, and furnished with a stop-cock to prevent the escape of air. The lower bulb is passed into the proximal opening of the artificial anus and inflated. The upper bulb, covered with a perforated, hard-rubber disk, rests upon the external surface and holds the lower against the inner surface of the abdominal wall, thus occluding the opening. The whole is held in position by adhesive straps passed across the rubber disk and attached to the abdominal wall. Various modifications of these plugs have been devised, but apparatuses of this type, while they control the faeces and are satisfactory for a time, usually produce so much local and reflex irritation that it is impossible for patients to employ them for any great length of time.

Many surgical devices have also been employed to establish faecal control in artificial ani. Among these may be mentioned twisting of the gut after the manner of Gersuny, rotating the intestinal loop in the abdominal wound so that the proximal opening will be below the distal,

and suturing the abdominal wound so closely as to constrict the external aperture in the gut. None of these, however, has proved successful. Many efforts have been made to establish an involuntary sphincter from the circular fibers of the gut. In one case the author apparently accomplished this by making tucks in the gut just above its point of exit from the abdominal wound by introducing several fine silk sutures longitudinally through the muscular layers for about 1 inch, the ends of which, being tied together, produced an aggregation of circular fibers at this point. The patient lived ten years after the operation, and always had comparatively good control. Subsequent trials of this method, however, were not so successful. One of the most ingenious of these attempts is that of Bernays, and was termed by him "*sphincteropæsis*." After fixing the gut and allowing it to adhere in position, he cut it across; he then dissected the mucous membrane and submucosa loose from the proximal opening in the gut for the distance of 1 inch, thus exposing the circular muscular fibers. The latter were then caught by catgut sutures running longitudinally and matted together. The mucous membrane was then trimmed off to the proper length and sutured back in its original position. The results of this operation, however, were not satisfactory.

Another attempt in this line consisted in tying a strong silk ligature around the intestine, just above its exit, sufficiently tight to narrow the caliber to about the size of the index finger. The ligature was buried by suturing the peritoneal coats of the gut over it (Fig. 333). This operation has nothing to commend it. Howse (Holmes's System of Surgery, vol. i, p. 801) first suggested bringing the loop of sigmoid out through the fibers of the rectus abdominis, thus hoping to obtain some sphincteric control from the contractions of this muscle.



FIG. 333.—LIGATURE THROWN AROUND PROXIMAL LOOP OF GUT IN COLOSTOMY IN ORDER TO SECURE FÆCAL CONTROL.

Von Hacker (Beiträge zur klin. Chirur., 1899, S. 628) advised splitting the rectus muscle both vertically and laterally, and then dragging the loop of sigmoid through this split; this operation is very difficult, and the amount of control obtained is not at all satisfactory. In fact, none of these

methods was any improvement upon the Maydl-Reclus procedure carried out by separating instead of cutting the muscular layers of the abdominal wall.

The first real advance toward the establishment of the modern permanent inguinal anus was that of Witzel (*Centralblatt für Chir.*,

1894, No. 40), who, instead of bringing the loop of intestine out through the first abdominal wound, made a canal for it by separating the external and internal oblique muscles over the brim of the pelvis, and sutured it to the opening in the skin 1 inch below (Fig. 334). Bailey modified this operation of Witzel by carrying the intestine down between the skin and the external oblique muscle, and bringing it out through an opening in the skin just above Poupart's



FIG. 334.—WITZEL'S METHOD OF COLOSTOMY.

The loop of intestine held by ligature is dragged through canal made between external and internal oblique muscles and brought out through opening in skin indicated by line below crest of ilium.

ligament, 2 inches below the abdominal incision (Fig. 335). Braun (*Bryant's Operative Surgery*, vol. ii, p. 996) proposed closing the lower segment of the gut after the manner of Schinzinger, dropping it back in the abdomen, and then carrying the upper segment underneath the skin to an opening on the anterior surface of the thigh (Fig. 336). Witzel, and Lenkinheld and Borchardt, who have applied his method, state that their patients all possessed excellent sphincteric control of both gas and feces without the aid of any bandage or compress whatever. The fact, however, that it is often impossible to obtain a loop of sigmoid sufficiently long to be brought out over the brim of the pelvis, renders this operation a very uncertain procedure. In Bailey's method, as well as that of Paul, a truss or compress placed upon the intestine as it passes from its exit from the abdominal cavity underneath the skin will effectually control both fecal and gaseous passages, but without such a compress this control is not so perfect as that claimed for the Witzel method.

Weir (*Med. Record*, 1900, p. 666) has combined the Schinzinger and

Witzel methods as follows: The ordinary incision for inguinal colotomy is made through the abdominal wall, and the loop of sigmoid in which the artificial anus is to be made is dragged out of the abdomen. It is then cut in two, the lower end being invaginated, closed with Lembert sutures, and dropped back into the abdominal cavity. A canal is then formed by separating the external from the internal oblique muscles out to the crest of the ilium, at which point the fascia is divided and the canal continued underneath the skin to a point about 2 inches outside of and below the crest. The upper end of the gut having been disinfected and tied with a ligature, the ends of which are left long, is then dragged through this canal and attached to the skin around the opening in the gluteal region (Fig. 337). The abdominal opening is then closed, the gut being sutured to the parietal peritonæum at the point of its exit from the peritoneal cavity. Great care must be exercised in incising the mesocolon to loosen the intestinal loop lest its circulation be interfered with and gangrene result, as happened in one case of Weir's. Theoretically there are two objections to this operation: First, the situation of the artificial anus would appear to be very inconvenient; second, the closure and dropping back of the distal end of the gut destroys all opportunity of disinfection and treatment of the lower segment through the artificial opening. The latter objection may be overcome by suturing the lower end in the inguinal wound and opening it at a later period after it has thoroughly adhered. Witzel, Borchardt, and Weir report that their patients suffered no inconvenience from the situation of the anus, and we may therefore assume that the first objection is without any particular force.



FIG. 335.—BAILEY'S METHOD OF PERMANENT COLOSTOMY.

On account of its ease in execution and most satisfactory results obtained from it, the author employs the following modification of Bailey's method in permanent colostomy.

Author's Method.—The operation is begun by the ordinary incision for inguinal colotomy. The fibers of the external and internal oblique



FIG. 336.—BRAUN'S METHOD OF PERMANENT COLOSTOMY. (Bryant.)

muscles are separated by a blunt instrument instead of being cut. The transversalis fascia and peritonæum are incised in a line parallel to Poupart's ligament. After abdominal exploration has been carried out with the hand and a permanent inguinal colostomy has been finally determined upon, a loop of sigmoid sufficiently long to be drawn at least 2 inches outside of the abdominal cavity is selected, and a tape or loop of large silk is passed around it through a small slit in the mesentery, the ends being left long and held by an artery forceps. The lower

fibers of the external oblique are then pulled downward, and the internal oblique is split laterally to the distance of about 2 centimeters ($\frac{3}{4}$ inch). A canal is then made between the skin and the external oblique downward to the extent of about 2 inches, opening through an incision in the skin just above Poupart's ligament (Fig. 338). This canal and incision should be large enough to admit of the loop of sigmoid being drawn through them without much compression. With the aid of the dressing forceps the knuckle of gut is then dragged through the lateral slit in the internal oblique and downward through the canal outside of the external oblique muscle until it emerges at the inferior opening in the skin. It is held



FIG. 337.—WEIR'S METHOD OF PERMANENT COLOSTOMY. (Bryant.)

in this position either by the passage of a glass rod through the opening in the mesentery, or by suturing it to the edges of the skin wound. The abdominal wound is then closed by chromicized cat-gut sutures in the muscular layers and a subcutaneous silk suture in the skin; it is then sealed by iodoformized collodion and dressed with sterilized gauze, over which a layer of rubber protective tissue is placed and sealed to the skin with chloroform. This latter precaution is taken to avoid infection of the primary wound through the escape of feces when the gut is opened.

If necessary, the loop of intestine may be opened immediately, but ordinarily it is better to wait twenty-four to forty-eight hours before doing so. This is accomplished by a simple slit in the line of the longitudinal fibers of the gut. After ten days or more, the protruding portions of the gut should be trimmed down flush with the skin and the artificial anus will present itself as a double-barreled aperture, one opening of which connects with the proximal and the other with the distal end of the sigmoid (Fig. 339). The gut is brought outside of the external oblique



FIG. 338.—PERMANENT COLOSTOMY (author's method).

The gut being dragged through the split internal oblique and then through the subcutaneous canal.

muscle in order that it will rest upon a resisting plane, and a truss or compress can be placed upon it, thus absolutely occluding its caliber. Being passed through the slit in the internal oblique, it is surrounded by muscular fibers, and thus obtains a certain amount of voluntary control. In the majority of cases no compressing apparatus is necessary, as the patient usually possesses almost complete continence without it. When it is necessary, an ordinary single spring hernial truss with an elongated pad placed somewhat outside of the usual position

serves every purpose. The author has practised this method in 7 cases, and in only 2 of them has a truss been necessary. With the latter in position, the continence was so perfect that it was necessary for



FIG. 339.—PERMANENT COLOSTOMY BY AUTHOR'S METHOD COMPLETED.

the patient to raise the truss in order to allow the escape of intestinal gases. Not only is the continence obtained by this method exceedingly satisfactory, but the site of the anus is very convenient for the patient. He can sit upon an ordinary toilet-seat with a pus basin held underneath the artificial anus and relieve his bowels with as little inconvenience as if the anus were in the normal position. The parts can be easily cleaned, and in the cases thus far observed there has never been the slightest tendency toward prolapse. The inferior

segment of the sigmoid can also be washed out and irrigated through this type of permanent artificial anus, thus obviating the danger of collections of pus and putrefying substances in this portion of the gut.

Colostomy on the Right Side.—Inguinal colotomy upon the right side differs from that upon the left on account of the anatomical variations in the parts. The ascending colon is not situated as low down in the pelvis as the descending colon; it is not continuous with a gut of like caliber, but united at an angle with the ileum; it ends in a blind pouch to which is attached the appendix vermiformis, which may prove a serious complication in colotomy on the right side; and finally, the mesentery of the ascending colon is usually so short that it is very difficult to bring a loop outside of the abdominal wall and thus form an efficient spur for the prevention of feces passing into the portion of the gut above the artificial anus.

Another point of importance with regard to colotomy upon the right side is the fact that the fæces are almost always fluid in this portion of the intestine, and under such circumstances it is almost impossible to form a permanent artificial anus which will possess any degree of fæcal continence on this side. Happily it is very rarely necessary to make a permanent artificial anus at this site. Temporary colostomy in this position, however, is sometimes called for in the treatment of chronic, intractable inflammations of the colon. In malignant diseases of the latter, those which are operable can be removed by resection almost as safely without preliminary colotomy as with it. In the inoperable cases, anastomosis of the healthy gut above the growth, with a similar portion below it, offers a better solution of the problem with almost as little danger to the patient's life as colotomy. When the operation is called for on account of inflammatory conditions, it should be made as high up in the ascending colon as possible in order to avoid the constant escape of fluid fæces through it. When the mesocolon is long enough for a loop to be brought outside and supported by a glass rod, the Maydl-Reclus method should be employed here as upon the left side. When this is not the case, one can only bring as much of the gut as possible up into the wound and suture it to the skin. This, of course, will not produce a spur sufficient to prevent the escape of fæcal matter into the intestine below the artificial anus, but inasmuch as such escape would necessarily be against the force of gravity, it will not be very great. As colostomy upon this side is nearly always of the temporary variety, no portion of the gut should be destroyed in opening it, for this will increase the difficulties of closure.

CHAPTER XXII

FOREIGN BODIES IN THE RECTUM AND SIGMOID FLEXURE

THE conformations of the rectum and sigmoid flexure render them peculiarly liable to the arrest and retention of foreign bodies.

There are three methods by which they enter these cavities: First, by being swallowed and passed through the intestinal canal; second, by their development in some portion of this tract and passage through it to the sigmoid or rectum; third, by introduction through the anus. Medical literature abounds with instances of foreign bodies of the most varied and marvelous character found in these cavities. Ale-jugs, champagne-bottles, segments of ball-bats, needles, pins, spools of thread, pipes, chain-saws, screws, nails, coins, bones, door-knobs, cows' horns, pocket-books, medicine glasses, and hundreds of other articles have been found in the rectum and sigmoid.

Physiological Causes predisposing to the Formation of Foreign Bodies in the Intestinal Canal.—These depend upon altered or deficient secretions from the intestinal glands, the liver, or the pancreas. Patients differ in regard to the habitual condition of the contents of the intestine; in some they are always more or less hard and dry, while in others they are always soft or fluid. These conditions depend largely upon the habits of the individual, upon his diet, and sometimes upon his temperament. Those who live in limestone regions and drink the hard alkaline water are liable to the formation of calcareous masses in the intestine. Where the intestinal contents are habitually dry and hard, it is very easy for a small foreign substance to form a nucleus around which the lime salts incrustate, and thus form fecal calculi which may be arrested in any of the saccules of the sigmoid or in the ampulla of the rectum; the small, hard masses seen in certain individuals who are the subjects of chronic constipation may also form the nucleus of such enteroliths. Rheumatism and gouty diatheses are said to have some influence in their production. Old age and prolonged constipation are the chief predisposing causes.

Pathological predisposing Causes.—Under this heading may be enumerated all the pathological conditions which tend to form concretions

or to narrow the rectum or sigmoid. Vitiating appetites, such as the eating of clay, slate-pencils, chalk, magnesia, etc., the formation and passage of gall-stones, and multiple adenoids or fibromata of the intestine are instances of these predisposing causes. Paraplegia and spinal paralysis at any level may be predisposing causes of the arrest of foreign bodies in the rectum and sigmoid, owing to the atony of the muscular fibers of the gut and consequent inability to pass these bodies out of the intestinal canal. Poulet says that "paresis" of the intestine plays an important rôle in the production of constipation and consequent arrest of foreign bodies. Stricture of the gut at any level may also be such a cause, but the arrest of stercoral masses above a stricture of the rectum or sigmoid could scarcely be considered under the head of foreign bodies. Hernias may also act in the same way, and such a condition should always be looked upon as a serious complication when bodies of unusual size are known to have been swallowed. Abdominal tumors also may be said to increase the probability of arrest of foreign bodies while passing through the intestinal canal, but there is no recorded instance in which they have actually done so.

Anatomical predisposing Causes.—In addition to the coarctations at the anus and at the junction of the rectum and sigmoid, unusual development of the folds of Houston, the crypts of Morgagni, and the diverticuli sometimes found in the large intestine are predisposing causes to the arrest of foreign bodies; displacements and adhesions of the sigmoid or transverse colon, hypertrophy and spasm of the external sphincter, may also be classed in this category.

Bodies which have been Swallowed.—Generally there is some knowledge upon the part of the patient of having swallowed such objects, yet sometimes, especially in children, the fact may have escaped their memories, or they may have been entirely unconscious of such an accident. The first intimation they have of the condition arises from the irritation and suffering due to the presence of the body. The author has recently seen 2 cases of the most marked suffering due to the arrest of foreign bodies at the anus, where the patients were entirely ignorant of having swallowed any such substances. One of these cases was in a gentleman from Boston, who was seized on a Friday with sharp, cutting pains in his rectum. His medical attendant, without examination, immediately surmised that he was suffering from fissure or ulcerating hæmorrhoids, inasmuch as some blood had appeared, and prescribed a soothing ointment for his relief. After having visited two other physicians in the mean time, neither of whom made a careful examination, he consulted the author on the following Tuesday; he was under the influence of opiates, and yet suffered intensely with pain in his rectum. An ocular examination showed congestion about the anus and slight

protrusion of small hæmorrhoids. These, however, did not account for his pain. An effort to separate the margins of the anus greatly increased his pain; upon attempting to introduce the finger into the anus it came in contact with a hard, angular body, pressure upon which gave the patient such agony that it was necessary to desist until he had been anæsthetized. After chloroform was administered, the finger was introduced alongside of the foreign body, the sphincter was stretched, and there was removed from the rectum the breast-bone of a snipe, kite-shaped, with three sharp points, which had been grasped by the sphincter so that they all punctured the mucous membrane. Infection and suppuration had set in, but no burrowing had taken place, and under antiseptic treatment the parts healed rapidly. The patient had no recollection of having eaten a bird of any kind except a snipe, some eight weeks previous to the time of his accident.

In the second case the outer hull of an apple-seed was arrested in one of the crypts of Morgagni, and grasped tightly by the sphincter. He also had consulted a physician, who told him he had fissure. It is not intended to relate a number of such cases in this connection; a brief outline of these two histories has been given to impress upon the reader the importance of local examination in such cases, and to illustrate how much suffering can be produced by the arrest of insignificant foreign bodies at this point.

When large bodies are swallowed accidentally the patient is always aware of the fact, and generally seeks for assistance or advice immediately. If the bodies are comparatively smooth and of a size which allows them to be swallowed without great difficulty, we may trust with fairly good confidence that they will pass through the intestinal canal, at least as far as the sigmoid or rectum. Arrest at the cæcum may occur, but this is rare. What passes the pylorus will usually pass through this aperture.

The length of time which a foreign body takes to pass from the stomach to the rectum is most variable. A case has been reported in which a plate of teeth, swallowed at night, was found in the anus the next morning. Another was treated in which the tin tag off a piece of tobacco was swallowed, and did not appear until found in the rectum almost three months later; in this case, the fact of the tin tag's having been swallowed at all was doubted, and yet the child was watched carefully during the whole period, and her rectum was examined regularly for the first two weeks without discovering any evidence whatever of the foreign body. Eighty-four days after the accident the author was called to her on account of griping pains in her abdomen and inability to move her bowels. Introduction of the finger into the rectum showed the tin tag squarely across the anus and forming a complete metallic

occlusion, with its five points sticking into the mucous membrane and the sphincter grasping it. The parents claimed the recovered tag as a family relic, and still retain it.

Another illustration of how long these bodies may remain in the rectum and continue to produce irritation, and yet not be discovered, is that related by Ackers (*London Lancet*, 1898, vol. ii, p. 690). The patient consulted him, complaining of the frequent desire to go to stool, but inability to accomplish it on account of a sharp, pricking pain immediately following any effort to relieve his bowels. He said that he had suffered from this pain for thirty years; sometimes it was more severe and sometimes less; when the faecal mass was hard, it was almost impossible for him to bear it; when the passages were fluid, the pain was not so severe, but that it had always been present, and that he felt it whenever he sat in certain positions. He had consulted physicians with regard to the trouble, and had been told that it was simply a fissure or hæmorrhoids, and soothing ointments had been prescribed. Upon examination, Ackers found a long bent pin which was stuck into the tissues just above the internal sphincter, and extended downward and backward almost to the skin, while the head, like a crank, extended quite across the anal aperture; thus, whenever the faecal mass passed over this, it carried the point downward and backward, producing a scratching, as well as a pricking pain. Without any anæsthetic, Ackers removed the pin, and the patient was immediately relieved. This case is quoted because it is reported by a man entirely worthy of belief, and yet it is almost incomprehensible that a pin should remain in the intestinal canal for thirty years without rusting and being dissolved by the secretions of that canal. Admitting this as a possibility, it is just as incomprehensible that any body should penetrate the mucous membrane and remain in this position for any considerable period of time without causing infection, abscess, fistula, or some perirectal inflammation. There seem never to have been any such complications in this case. The length of time intervening between swallowing a foreign body and finding it in the rectum or sigmoid does not indicate how long it has been arrested at this point, for it may have been lodged in some fold or diverticulum of the intestine, dislodged and arrested again and again in its passage through the canal; but such cases as Morton's (*Penn. Hosp. Repts.*, 1880, p. 335), in which the foreign body was known to have been in the rectum for four years, and Ogle's (*Proc. Roy. Med. and Chir. Soc.*, London, 1861-'64, p. 267), in which a stick remained in the rectum four months, gives one some idea of the possibilities in these cases.

The cases which interest us most, and which will give the practitioner more trouble, are those in which the foreign bodies have been swallowed

unconsciously or thoughtlessly, and in which the symptoms of arrest come on later. Fruit-seeds, coins, false teeth, pins, buttons, etc., frequently pass through the alimentary tract and become arrested in the sigmoid or rectum. The author once removed from the rectum of a lady a mass of grape-seeds almost as large as a foetal head, that weighed 22 ounces. Examination with the speculum showed that the rectal mucous membrane was studded all over with little ulcerated spots, evidently the result of punctures from the points of the seeds. The patient had suffered from a watery diarrhoea that might easily have misled one who was not in the habit of making local examinations in all cases of diarrhoea and constipation. Poulet (*op. cit.*, p. 304) relates a case in which 60 snails were found in the patient's rectum, and the author has seen 2 cases in which plates of false teeth were swallowed and lodged, 1 in the sigmoid and 1 in the rectum.

Enteroliths; Colproliths; Fæcal Stones.—Fæcal concretions develop in those portions of the intestine where the movement of the fæcal current is not active, at the hepatic and splenic flexures, the caecum, the sigmoid, and in the ampulla of the rectum. The vermiform appendix is also a frequent site for their formation, but they rarely pass out from this organ. They are of a firm consistence, and sometimes form real enteroliths.

Leichtenstern describes three varieties: First, concretions of a stony consistence, brown in color, and composed of phosphates of magnesium and calcium. They are formed by concentric layers around foreign bodies, such as inspissated masses of fæces, ascarides, small pieces of bone, fruit-seeds, etc. Second, concretions of light specific gravity composed largely of undigested vegetable matter. Third, chemical stones, or those resulting from the protracted use of calcium and magnesium carbonates, bicarbonate of soda, salol, and other drugs. This last variety is not frequent, but they may acquire enormous size, and even cause obstruction of the intestine. They become dislodged from the points at which they form, pass downward, and are arrested in the sigmoid or rectum. A very interesting specimen of this kind was shown me by a member of my class during the winter of 1898. He was called to see an old lady suffering with intense pain in the right inguinal region. Upon examination he felt a mass about the size of a cricket ball or larger. There was no fluctuation and no rise in temperature. The woman said the lump had been there a long time, and thought it had nothing to do with her pain. He administered a mild laxative and ordered large rectal enemata, and called to see the patient three days later. Notwithstanding the fact that no unusual mass or solid fæcal matter had passed, the lump which he felt before had absolutely disappeared, and the patient complained of a weight in her back and pressure at the

lower end of the rectum. An examination with the finger in the rectum elicited a mass hard as a rock and so large that it was impossible to remove it without divulsing the sphincter. The body when shown had every appearance of stone formation; it was 4 inches long by $2\frac{3}{4}$ wide, rounded at both ends and sides, and formed an elliptical, smoothly polished body. The woman gave no history of ever having swallowed any foreign body, and there was no possibility of its having passed from the bladder into the rectum, as that viscus was absolutely healthy. Evidently it had been formed in the cæcum or appendix, and being set free it was carried along the canal until it lodged in the rectum. Gant has also reported an interesting case of this kind (Proceed. Amer. Proctologic. Society, 1900).

Foreign Bodies introduced into the Rectum.—When foreign bodies have been introduced into the rectum through the anus, there is nearly always a knowledge of such condition when the patient seeks advice. Unfortunately, the purposes for which these bodies are introduced are of such a nature that the patient will not admit the accident until he is forced to do so by great pain and dire distress. Such introduction may be intentional or accidental. Ball, quoting Hamilton, says that the inhabitants of Balason, on the Bay of Bengal, were in the habit of introducing into the rectum after defecation small bodies of clay, and removing them at the next stool. This was done with a view of preventing further movements during the day, or it may have been done for hygienic purposes, but there is no history given of any of these bodies having been retained (A New Account of the West Indies, London, 1708).

In some countries foreign bodies are introduced into the rectum as a means of punishment, but usually they are introduced for the relief of certain symptoms, for excitation of passion, for the purposes of concealment, or by accident.

Foreign Bodies introduced for the Relief of Certain Symptoms.—A large number of foreign bodies have been found in the rectum, introduced by ignorant people for the purpose of relieving some pathological condition. Some have used these bodies to provoke a movement of the bowel and thus remedy an obstinate constipation; others have introduced them with a view of controlling a diarrhœal discharge.

One theoretical individual, who evolved the idea that the less matter he discharged from his bowel the less food he would need in order to live, introduced a stone jar into his rectum to avoid fæcal movements. It was with great difficulty and pain that the body was removed. Moran reports the case of a pious monk, who suffered with a severe colic, and thought to relieve the same by pouring a bottle of Hungarian water into the rectum, and so arranged himself that the water would flow

little by little into the intestine. The bottle slipped from his grasp, escaped into the rectum, and resulted, not in his relief but in the increase of his colic, and an inflammation which threatened his life. After many attempts by forceps and other instruments to remove the bottle, it was finally dragged out by the hand of a small boy who was induced to thus relieve the good monk.

Where these bodies are introduced for legitimate purposes, such as those mentioned, and escape from the grasp of the patient, there is generally no delay in consulting a physician, and little irritation, inflammation, or swelling complicates their removal, but the large majority of these bodies are introduced into the rectum for other purposes or by accident.

Foreign Bodies introduced for Purposes of Concealment.—The rectum has long been known as a means made use of by thieves and criminals for the concealment of stolen articles or instruments for crime; jewelry, coins, money, gems, false keys, etc., have been concealed in the rectum, and found there, sometimes after death and sometimes during life.

The well-known report of Closmadeuc (Society of Surgery, May 15, 1861) describes a case of a criminal from whose transverse colon there was removed a sort of box or *nécessaire*, covered with the omentum of a lamb, and containing coins, several small saws, and numerous instruments for effecting his escape from prison. This article had been introduced into his rectum for the purpose of concealment, and had gradually worked its way upward into the position in which it was found, where it produced peritonitis and the subsequent death of the patient. There are a large number of cases on record of this kind, and a knowledge of such facts is important to prison physicians as well as to the police.

Foreign Bodies introduced into the Rectum by Accident.—It is a rare thing that foreign bodies are introduced by simple accidents, such as a fall on pointed sticks or on the palings of fences, which penetrate the anus and are broken off and left there. An interesting case of this kind is reported by Hawkins (Indian Lancet, 1898, vol. i, p. 417), in which an Italian, dancing an obscene dance around a tumbler set on the floor, slipped and fell upon this object. The tumbler broke, and about $\frac{2}{3}$ of its bowl penetrated the man's anus and lodged in the rectum. The patient reported having had a great hæmorrhage, but at the time that he entered the hospital this had ceased. Two points of the broken tumbler had penetrated deeply into the perirectal tissues, and it was impossible to withdraw the object until the doctor had excised the coccyx and split the rectum upward for about 2 inches, thus affording room to remove it backward and disengage the points penetrating the tissues in front.

Delbet (*Gaz. hebdom.*, Paris, 1877, p. 1069) was the first to make use of Amussat's suggestion to cut out the coccyx in order to gain space for the removal of foreign bodies from the rectum. Buffet (*Normandie méd.*, April, 1894) has also employed this method. It indicates a very practical procedure, which may be adopted in cases of large bodies, the lower ends of which penetrate the tissues about the margin of the anus.

Camper (*Prix de l'acad. de chirurg.*, t. xii, p. 165) reports the case of a man who fell from a considerable height upon the sharp point of a piece of wood which penetrated his anus and entered the bladder, resulting in a urinary fistula. The pieces were removed from the rectum about one year afterward, coated with a calcareous deposit from the urine, and the patient made a good recovery.

The history of the brutal murder of Edward II, by the introduction of a red-hot iron into his rectum, is quoted in many books as an instance of foreign body in this organ. Its bearing in this connection is not apparent, but a number of cases have been reported in which individuals have had foreign bodies introduced into their recta, either as a practical joke or in revenge for some offense.

An instance of this kind is reported by Matienzo (*New York Med. Record*, 1898, vol. liii, p. 533), in which a man, during a drunken debauch, had shoved into his rectum a piece of smooth wood, spherical at the top, but rough and serrated at the bottom, 26 centimeters (10 $\frac{1}{2}$ inches) long and 6 centimeters (2 $\frac{1}{2}$ inches) in diameter. The patient began to suffer from pain in his abdomen immediately after recovering from his debauch, but never realized that any foreign body was present until he consulted a physician sixteen days afterward, when the body was found, the upper end being felt through the abdominal wall to the left of the umbilicus. It was removed by traction on the lower end, and pressure from above.

Under this head may also be mentioned those distressing and detestable cases in which foreign bodies have been used for the purposes of exciting passion in degraded and depraved individuals, and which have accidentally slipped into the rectum. Perhaps the majority of the large foreign bodies, such as bottles, sticks, lamp chimneys, pipe-stems, etc., found in the rectum have occurred in this way. It is usually in old men whose desires have survived their virile powers, and any explanation which they may give of these accidents will ordinarily be utterly unreliable and unworthy of belief. In such cases the infundibular shape of the anus, the evidences of traumatism, and the irritation of the parts will generally give a good idea of the moral character of the patient, and point to the real cause of suffering. Under such circumstances, and with guilty consciences, patients trust to the illusory

hope that the bodies will be passed spontaneously. They do not, therefore, consult a physician until their sufferings have become unbearable and their condition often desperate, if not absolutely beyond relief.

Some remarkable cases have occurred in which large bodies have remained in the intestine for considerable periods of time without perforation, and have worked their way upward until they were beyond the reach of the hand or of instruments for their removal through the rectum.

Poulet, quoted by Kelsey, reports a case of a farmer who introduced a piece of wood, over 13 centimeters (+ 5 inches) long and nearly 3 centimeters (+ 1 inch) in diameter, roughened and serrated at its broken end, into the rectum. All attempts to remove it failed, and it passed up into the sigmoid, and could be made out apparently as high as the floating ribs. After thirty-one days, during which enemata and cathartics were given with greater or less regularity, the object was passed by the rectum, and proved to be the end of a bean-pole. The patient recovered without any serious difficulty.

Pierra (Indian Med. Record, 1896, p. 131) reported the case of a man who passed a roughened stick $9\frac{1}{2}$ inches long by $1\frac{1}{2}$ inch in diameter into his rectum. This was extracted without any permanent damage having been done.

The results are not always so favorable. Several instances have been reported in which the body penetrated the bladder, leaving recto-vesical fistula; others in which the peritonæum was perforated, causing death; and very many in which rectitis, ulceration, periproctitis, fistula, and sepsis have followed the introduction of foreign bodies into the rectum.

SYMPTOMS.—The symptoms in these cases are subjective and objective.

Subjective Symptoms.—Ordinarily the patient will consult a physician for symptoms which may be referred to simple intestinal or rectal complaints, such as constipation, diarrhœa, hæmorrhage at stool, tenesmus, the passage of mucus, slight passages of blood, etc. If the foreign body has entered the rectum through the mouth, or through having been formed in the intestine unknown to the patient, or if it has been introduced into the anus for legitimate purposes, the patient will generally give a true account of his condition, not biased by any embarrassment or shame, and the correct diagnosis may be easily made. Where the body is small and arrested in one of the folds of Houston or the crypts of Morgagni, the pain may be more or less constant, or it may only appear when straining at stool. This will depend largely upon the shape of the body; if it is a round, smooth body, it will cause little suffering. If it is an irregular body, with sharp edges or points, it will give pain upon motion and efforts at defecation; if the mucous membrane or the

walls of the rectum have been penetrated, this pain will be more or less constant; especially will this be so if the foreign body be grasped by the sphincter muscle, as in cases where a sharp body, such as a fish-bone or pin, has lodged at the anus. A case with all these symptoms has been reported by Billingslea (*Southern Med. and Surg. Jour.*, August, 1856, p. 148), in which there was an arrest at the juncture of the rectum and sigmoid of a piece of bone which the patient had no recollection whatever of having swallowed. In other cases the foreign body may present symptoms of fissure in ano, with nervous and constitutional disturbances. A small piece of egg-shell arrested within the grasp of the sphincter has given rise to such symptoms in a case reported by Whitehead (*Transactions of the Colorado Med. Soc.*, Denver, 1874, p. 42).

If the body be large and its edges smooth or round, the pain will not be acute, but a dull, heavy, aching pain, increased upon movement or jarring, bending down, efforts at stool, and sometimes the sitting posture, through pressure upward upon the perinæum and downward upon the abdomen, will give great discomfort. The fact that these patients have numerous stools during the day of thin, watery fluid may lead the physician to suppose it is a case of diarrhœa.

Spasm of the sphincter and levator ani muscles are often present with foreign bodies in the rectum. These spasms are increased by whatever act or motion causes the foreign body to press upon the muscles. Sometimes the spasm occurs upon bending over or sitting down upon the commode; at other times, where the muscles and membranes are penetrated by sharp points, the spasm is continuous.

Constipation is frequently observed, but this is a relative term and not much can be gathered from it as a symptom. When symptoms of obstruction appear, such as swelling of the abdomen, nausea, vomiting, hiccough, high temperature, rapid pulse, etc., the case becomes very grave. Genito-urinary symptoms are a very frequent complication of foreign bodies in the rectum. Sometimes these symptoms so predominate that the physician is led in the beginning to consider those organs as the main cause of offense, and to search them in vain for some condition to account for the suffering. Dysuria, anuria, cystitis, neuralgia of the testicles, pain in the scrotum and along the tract of the crural nerves, are frequent complications. These are due, first, to mechanical pressure upon the parts by the foreign body and, second, to reflex action.

When the body has remained for some time in the intestine and produced much irritation, grave constitutional symptoms, such as cold sweats, fainting, convulsions, and high temperature, may supervene. Hawkins (*The Indian Lancet*, 1898, p. 417) reported an interesting case of this kind in which a glass tumbler was introduced into the rectum with a view of overcoming diarrhœa, and was broken in the

efforts of the patient to extract it. The doctor was consulted after the patient had suffered for some days, the symptoms being those of intestinal obstruction; he succeeded in removing the glass and relieving the patient.

Objective Symptoms.—The physical symptoms which are produced by a foreign body in the rectum are very vague and indefinite, especially if the body is formed in the intestinal canal, or has entered through the mouth, and thus approaches the rectum from above. Ordinarily ocular observation will reveal nothing to indicate the nature of the patient's disorder. There may be a protrusion of hæmorrhoidal tumors, a slight discharge of pus, a moist condition about the anus, or sometimes a prolapse of the mucous membrane of the rectum, but all of these conditions are compatible with simple inflammatory diseases of the rectum, and are not necessarily connected with foreign bodies.

If the latter are introduced through the anus, there may be some wound, crack, or fissure of the parts indicating the cause of the trouble, but it is remarkable what large bodies can be passed through the anus without producing any apparent lesions. Poulet says hæmorrhage of moment rarely if ever occurs except when leeches have been introduced into the anus.

If the foreign body is introduced by accident, such as falls upon sharp objects, the wound of a bayonet, or impaling upon a stake, considerable hæmorrhage may follow immediately, and yet at the time of the examination by the surgeon no bleeding may be present. In certain cases, where the foreign body is very large, a bulging of the perinæum may be felt and seen; when such is the case the anus generally protrudes to a certain extent, and the hæmorrhoidal vessels are congested and swollen, forming a sort of a nipple upon the distended perinæum.

Diagnosis.—The only reliable means of diagnosis in these cases are the educated touch and the rectal tube. Where the body is low enough down to be felt, the finger is all that is necessary; but when, as frequently occurs, the body has slipped beyond the reach of the finger, or has lodged at a point so high up that it can not be touched by digital examination, recourse must be had to a rectal speculum of some sort.

The pneumatic proctoscope and the simple rectal tube are the most useful instruments for this purpose, and they serve also as a means through which to grasp the foreign body and drag it down. With these instruments it is possible to see and clearly diagnose the presence and nature of the body up to the lower end of the descending colon. In those cases in which it is arrested in one of the crypts of Morgagni, the fenestrated speculum used in connection with a laryngeal mirror is of great value.

When the body is arrested above a stricture or hypertrophied valve of Houston, a bent probe or searcher may be necessary to make this search.

Complications.—The complications or accidents associated with foreign bodies are very numerous, and depend largely upon the character of the body, the method of its introduction, and the amount of manipulation and traumatism in efforts to expel or withdraw it.

In spontaneous expulsion of small foreign bodies, such as bones, pins, seeds, needles, etc., there may be wounding or tearing of the mucous membrane at any point of the sigmoid or rectal tract. Frequently these bodies produce only a slight scratch of the parts, cause some little pain, and the symptoms rapidly disappear. Sometimes, however, the injury may be more extensive. The patient may have considerable hæmorrhage, as from a hæmorrhoid, and there may result an acute fissure, and an ulcerated or inflammatory condition about the margin of the anus.

This spontaneous expulsion of foreign bodies from the rectum may take place after the body has remained there for comparatively long periods. Schmidt (*Annals de Schmidt*, 1862, vol. cxiii, p. 95) reports the case of a man who passed a piece of wood $5\frac{1}{2}$ inches long, after it was embedded in the rectum for thirty-one days. The length of time which foreign bodies may rest in the cavity without serious inconvenience has already been discussed, but the longer they remain the more likely are they to produce serious complications. When large they cause congestion, inflammation, thickening of the walls of the gut, ulceration, and sometimes stricture. Invagination or prolapsus is also said to have been produced by their presence in the rectum, exciting constant peristaltic action and straining at stool. Where the object is of an irregular nature, with sharp edges or points, the walls of the gut may be perforated and produce perirectal inflammation, abscess, and fistula. After the removal of such bodies from the rectum, one should always carefully examine the parts to be sure that no blind fistula has been left behind.

Punctures by these bodies may cause localized suppurative peritonitis, and yet not prove fatal on account of the tendency of Nature to shut off such septic products and enclose them in separate cavities, thus to protect herself from general infection. The cases, however, in which the peritoneal cavity is opened through gangrene due to pressure upon the parts are sure to prove rapidly fatal.

One other complication should be noticed, and that is the fact that foreign bodies that remain in the rectum for considerable periods of time may become coated with calcareous substances, generally phosphate of magnesium or lime. Sometimes this coating may be due to a recto-

vesical fistula, and the leakage of urine into the rectum (Crummer, Kelsey), and at others it is due to incrustations from the intestinal salts. Dahlenkamp (Poulet, p. 313) has reported a case in which a piece of wood introduced into the rectum was thoroughly incrustated with a silvery, crystallized phosphate of lime. The incrusting material will aid in deciding the nature of the injury.

The symptoms and history of foreign bodies in the rectum may exist, and yet one may find it impossible to determine their presence either by digital or ocular examination. This may be due to the fact that the foreign body has dropped into a diverticulum of the rectum or has penetrated the mucous membrane and passed into the surrounding tissues.

Cunningham (Southern Med. and Surg. Jour., Augusta, 1887, p. 764) gives an account of a foreign body found in the nates 6 inches or more from the anus, but which had evidently penetrated the wall of the gut above the internal sphincter, and thus burrowed down in the direction in which it was found. This was a case in which there was no particular history of a foreign body's having been in the rectum; but the following case (Phil. Tr., London, 1720-'35, p. 521) is one in which a distinct history of the foreign body was given. The patient had introduced a fork, with its tines downward, into the rectum a short time previous. Shame and embarrassment prevented his seeking relief until his agonies were so great that he could no longer bear them. Upon consulting a physician, the latter found a sharp protrusion in the man's buttock some distance from the anus, with one of the tines of the fork almost penetrating the skin. An incision was made, and the fork dragged through this, leaving a complete fistula, which afterward healed. Turney (Nashville Med. and Surg. Jour., 1883, p. 261) and Hood (Australasian Med. Gaz., 1888, vol. viii, p. 285) have reported similar cases. In Hood's, the foreign body penetrated the rectal wall, burrowed through the perineum, entered the scrotum, and there caused a scrotal fistula.

All such cases give a certain number of rectal symptoms, or at least a history of having suffered from rectal irritation, although at the time at which they consult the surgeon these may have disappeared and other symptoms predominate. Careful exploration of the rectum will frequently make plain obscure conditions by the discovery of small foreign bodies or internal blind fistulas through which the foreign body has passed into the surrounding tissues.

Prognosis.—In general, one may say that the large majority of cases of foreign bodies in the rectum end favorably. From reading the most popular works upon diseases of the rectum, one would judge that these accidents never ended in any other way except when they penetrated the peritoneal cavity. As a matter of fact, however, there have been a number of fatal cases in which this cavity was not penetrated.

Canton (*Lancet*, 1849, p. 620) reports the case of an old man who died from hæmorrhage brought about by fish-bones in the rectum. The post mortem showed a number of fish-bones throughout the large intestine; the lower half of the rectum was three times as thick as normal, and the mucous membrane was gangrenous and deeply perforated posteriorly. Half a dozen of these bones were entangled in the deeper area, some of which entered the hæmorrhoidal vessels and caused the hæmorrhage. C. S. Briggs (*Nashville Jour. of Med. and Surg.*, 1880, p. 149) records the case of a man who had introduced a wine-glass into his rectum, measuring 5 inches in circumference and $2\frac{1}{2}$ inches in length, in order to control diarrhœa. The foreign body was removed under anæsthesia. The posterior wall of the rectum was lacerated, and the man lost a large amount of blood. The diarrhœa continued, and the patient died at the end of one week. A question here arises whether the patient died from the diarrhœa, which did not seem to be dangerous at the time of the operation, or whether it was due to injury of the rectum, loss of blood, and subsequent infection. The latter theory seems the most probable. Laroyenne (*Gaz. méd. de Lyon*, 1867, p. 49) has reported a similar case to this.

M. Tillaux (*Bull. et mémoires de chirur.*, Paris, 1877, p. 532) gives an interesting account of a man who had introduced a bougie into the rectum, and it slipped from his grasp. By examination of the abdomen one could feel the upper end of the bougie in the left iliac fossa. The patient developed an abscess in the fossa before the bougie was removed, and died the second day after it. The post mortem showed localized peritonitis around the sigmoid, but no perforation. The rectum was healthy, but in the sigmoid flexure there was a large ulceration about the size of a 50-cent piece, which was no doubt the point where the extremity of the bougie was arrested for the five days during which it was retained. Stone, quoted by Gibbs (*Western Lancet*, 1856, p. 7), reports the case of a man who passed a tin cup into his rectum for prolapse. All efforts to remove it were unsuccessful, and the patient died from peritonitis without puncture, so far as I can learn.

Weist (*Indiana Med. Jour.*, 1873, p. 17) has recorded a very interesting case of a man who had been accustomed to treat his hæmorrhoids by passing into his rectum a corn-cob, $2\frac{1}{2}$ inches long and $\frac{3}{4}$ of an inch in diameter. To this he had attached a sort of a handle; one day, upon its introduction, the handle broke off and the corn-cob slipped into the rectum. He consulted Weist sixty hours later, at which time his abdomen was found swollen and tympanitic, his pulse quick, and he was suffering from nausea and hiccough. The foreign body could be felt in the sigmoid, but it was impossible to remove it through the

rectum, owing to its lying at an angle and the handle being caught in one of the folds. The patient died eighty-four hours after the introduction of the foreign body. The post mortem showed a general peritonitis. The corn-cob projected $1\frac{1}{2}$ inch through the sigmoidal walls. Its total length, with the broken handle, was 4 inches. This case has been quoted somewhat at length in order to bring out the fact that perforation of the rectum and sigmoid is not always due to the force used in the introduction of the foreign body, nor to rough manipulation in efforts to extract it. They may be brought about by peristaltic movement, tenesmus, and straining of the patient himself. In this case the body was too short to have been pushed through the gut by the patient, and no efforts had been made to extract it. Where such a body is left in the intestinal canal for any undue length of time it will cause inflammation and ulceration by pressure, thus weakening the intestinal wall and inviting perforation; it may then, during a spasm or period of tenesmus, be thrust through into the peritoneal cavity and cause death.

The prognosis in these cases will therefore depend upon the nature and shape of the body, upon its size, the force with which it is introduced, the roughness of manipulation in the efforts to withdraw it, and, finally, upon its location, whether above or below the peritoneal *cul-de-sac*. Perforation of the bladder through the rectum is likely to end fatally through infection of the bladder and its progression to the kidneys.

If none of these complications occur, and the bodies are promptly removed and properly treated, the prognosis in these cases is generally good. Their dangers, however, should never be underrated, and positive opinions should not be given until all risk of secondary complications has passed, especially in cases in which the foreign body is in or above the sigmoid flexure. [Velpeau (*Elements of Surg. Path.*, 1858, p. 42), Dor (*Gaz. méd. de Paris*, 1833, p. 199), Lane (*Brit. Med. Jour.*, 1874), and Tillaux (*Gaz. hôp.*, 1877, p. 695).]

Treatment.—The ingenuity exercised in the introduction of foreign bodies into the rectum is only exceeded by that necessary for their removal. They are generally introduced with the conical end upward, and thus the sphincter is gradually dilated until the object slips from the grasp and the muscle contracts behind it. Their removal must be obversely, with the large end first, and is consequently more difficult. The spasm of the sphincter consequent upon the traumatism increases the difficulty of withdrawal.

Where the body is of a soft substance, such as wood, it may be grasped by a forceps, or a gimlet or screw may be introduced into it to assist in its removal. When, however, it is composed of glass,

porcelain, steel, or stone, it will be much more difficult to grasp it, and, moreover, the breaking of the object into fragments will greatly complicate affairs. Too great pressure or too much manipulation of the body in order to grasp it may cause it to slip beyond reach and enter the sigmoid flexure. If the upper end of the object be pointed, such manipulation may cause it to perforate the intestine and bring on fatal peritonitis. Thus one must avoid pressing too firmly upon the abdomen from above or upon the object below in these manipulations.

In general, it will be necessary to anæsthetize the patient and dilate the sphincter before any attempt at removal is made. The parts should first be irrigated thoroughly with antiseptic solutions to remove, as far as possible, causes of infection. After this a large injection of oil will facilitate the operation by lubricating the parts and causing the body to slip more easily through the constricted points. If the caliber of the anus is found insufficient for the removal of the foreign body, it will be advisable to split the rectum backward to the coccyx and upward through the internal sphincter. By this procedure abundant room will generally be afforded for the removal of any body which has originally been introduced through the anus. Sometimes it may be necessary to excise the coccyx before the body can be removed. Buffet has reported a case of this kind (Normandie méd., 1894).

The necessity of such operations is brought about by the congestion, œdema, and swelling following the introduction of the objects; otherwise a body which passed through the anus going in could be forced through it on withdrawal. When the lower ends of these bodies are rough and serrated, their withdrawal is made difficult or impossible, owing to the fact that these points and rough ends catch in the mucous membrane or the folds of the rectum and arrest their passage in the outward direction. In such cases the operator will have to exercise his ingenuity to cover such points by gauze or other substance in order to facilitate their withdrawal.

The classical case of Marchettis (Poulet, *loc. cit.*, p. 260) illustrates this. A boar's tail, with the bristles cut short and pointing toward the end, was introduced into the rectum, leaving a small portion of the end extending through the anus. Any effort to pass it, or at withdrawal, only sunk the bristles more deeply into the mucous membrane and held it in position. Marchettis ingeniously selected a hollow reed, and, after having first tied a string to the end of the tail and passed it through the reed, he slipped the latter upward upon the boar's tail, thus reversing the direction of the bristles and loosening them from their punctures in the mucous membrane. He thus removed the body with great success, and gave immediate relief to the patient.

When the body is composed of soft metal, such as hairpins, wire,

safety-pins, nails, etc., they may be cut in two with forceps and removed piecemeal.

Lefort has suggested that when the body is hollow it might be filled with plaster of Paris, allowing this to harden, with a handle of some kind in its center, thus affording a grip by which it can be removed. This is an ingenious method, but unfortunately in most cases the opening into such bodies is upward, and the filling it with plaster from this direction would be impossible and at the same time useless.

The application of an obstetric forceps has been advised by some writers, but one can understand how difficult it would be to apply them to a large body in the rectum. A very small placental forceps might be useful in removing smooth, round bodies which it is difficult to grasp.

Where the object is of glass, china, or any fragile material, great care must be exercised not to break the same if it can possibly be avoided, lest the fragments should cut the blood-vessels and cause severe hæmorrhage or puncture the peritonæum. Occasionally it must be done; it is well under such circumstances to pack a layer of gauze around the foreign body between it and the rectal wall before shattering it, in order to collect as many of the small pieces as possible, and to protect the rectal wall from injury by the fragments. This is not a difficult proceeding; if the body is low enough down to be grasped and broken, it can be steadied while the gauze is being packed around it. If the obstetric or placental forceps is used, it should be covered with gauze or flannel for this purpose.

A complication has arisen in some cases, in which a body with an open aperture at the upper end has been introduced into the rectum, from the fact that straining and tenesmus have caused the upper segments of the bowel to prolapse into this aperture, and, becoming congested and swollen, thus absolutely obstructed the intestine.

The difficulty here is not only in the removal of the body, but in doing so without injuring the prolapsed gut. If the bottom can be perforated and cocaine or extract of suprarenal capsule applied, the congestion may be so reduced that the prolapse will be released, and then the body can be removed without much injury to the parts; otherwise the object will have to be broken and the injuries repaired.

Another danger with regard to such bodies in the rectum is that by too vigorous and unwise manipulation they may be pushed upward into the sigmoid flexure, where they can no longer be felt by the finger or grasped by any instrument to withdraw them from below. It is said that these bodies are carried up in this direction and beyond reach by the retroperistaltic action of the intestine described by O'Beirne. I have never seen anything that convinced me of this action. Bodies

which have traveled upward in this way have always been those which had sharp edges or points below, so that when the motion of the body or intestine took place, they were lifted up little by little, exactly in the same way that a head of bearded rye, when introduced upside down into the lower end of a boy's trousers, will crawl up to his shirt-collar as he walks along. The retroperistaltic action is not necessary to account for the movement of these bodies; it is simply a question of mechanical action, which is found in numerous instances in nature.

Sometimes where the foreign body has come from above and has lodged in the sigmoid flexure, the introduction of a long sigmoidoscope to establish its presence and to determine its nature may straighten out the convolutions, excite an active peristalsis, and cause the body to be expelled shortly thereafter. This occurred in the case of a friend of the author's, who swallowed his false teeth. The plate was not found in the rectum or seen in the sigmoid at the time of examination, but within an hour afterward it was protruded at the anus during stool. If the body can be seen through such a tube it may be located at the end of the instrument, grasped with an alligator forceps, and gently drawn out through the intestine. If the pneumatic proctoscope is used, the dilatation of the gut will allow of the body's being passed along without any mutilation of the parts.

Always after the removal of a foreign body from the rectum the organ should be thoroughly irrigated and washed out with antiseptic solutions, such as boric acid or 1-to-8,000 bichloride of mercury. If the bowels have not been moved regularly, a cathartic should be given at once to relieve them of any accumulation that may be present. But as soon as this has been accomplished, some opiate or sedative should be given to quiet the peristaltic action, and thus give an opportunity for rest and the subsidence of all congestive and inflammatory complications.

The application of styptics to control hæmorrhage in the rectum has been productive of more harm than good. Irrigation with cold or very hot water and pressure by packing are the best means to accomplish this.

Removal by Coliotomy.—When large bodies have escaped, or have been arrested in the sigmoid flexure, much manipulation to remove them through the rectum should be avoided. The dangers of rupturing the gut above the juncture of the sigmoid and rectum are always present, and if the foreign body has produced inflammation of the parts, these will be increased. Under such circumstances the proper and rational proceeding is to open the abdominal cavity at once, make a longitudinal incision in the gut, and remove the foreign body through this aperture. If the gut is healthy and not gangrenous, it should be closed and dropped

back into the abdominal cavity; otherwise it should be drawn through the abdominal wound until all the diseased area is outside, and then sutured to the edges. It may be cut off, or if it resumes its normal condition it can be closed and restored to the abdominal cavity at a later period. The incision for such an operation should always be made at the left side and in line with the rectus muscle, inasmuch as the sigmoid and descending colon can be most easily reached from this point.

When the foreign body has been located in the intestine it should be drawn out of the abdomen, if possible, and the cavity thoroughly packed off with sterilized gauze before the gut is opened. Sometimes, on account of its length, it is impossible to draw the entire body out of the wound. In such cases, for instance, as that of Pierra, in which the piece of wood was $9\frac{1}{2}$ inches long, only a part of it could be brought out before the intestine was opened.

Thorndike (Boston City Hospital, 1882) reports the case of a man, forty-one years of age, who had been in the habit of introducing foreign bodies, such as bottles and jars, into his rectum for the relief of the retention of urine. At one time, not having any of the objects which he was in the habit of using, and finding a comparatively round, smooth stone (weighing about 2 pounds, elliptical in shape, and smaller at one end than at the other), greased it, and, introducing the smaller end into his anus, sat down upon it. While he was thus seated the sphincter gave way, and the stone suddenly shot up into the rectum. Efforts were made by surgeons and others to remove it, but the more it was manipulated the farther it receded from the anus. A small boy was induced to pass his hand and arm up into the patient's rectum, but, passing it the whole length, could not reach the stone.

Thorndike found the patient forty-eight hours later suffering from tympanites, pain, high temperature, rapid pulse, and, in fact, with all the symptoms of septic peritonitis. With his hand in the rectum he could feel the foreign body in the abdominal cavity, but could not reach it. By an incision at the outer border of the left rectus muscle the peritoneal cavity was opened, and the stone found loose among the intestines. The aperture through which the stone escaped from the intestine was about 8 inches above the anus, and was not gangrenous. It was closed and the patient recovered. Now it is perfectly clear that this stone was thrust through the intestinal wall by the efforts to remove it. Nature would never exercise retroperistaltic force enough to rupture her own organs in any such way as this.

While there is no other recourse for the removal of foreign bodies which have escaped beyond the reach of instruments and the hand than

laparo-enterotomy, one should not be misled by the literature upon this subject as to the favorable prognosis in these cases.

Poulet quotes three cases in which the operation has been done, and all of them successfully. Kelsey quotes the same three cases. Stuts-gaard, Thorndike, and Realli have successfully removed large foreign bodies by laparo-enterotomy, but all the cases in which this has been tried have not ended so favorably. Thus Stanton (*Brit. Med. Jour.*, 1881, vol. i, p. 848) removed a wine-bottle by this method, and the operation was promptly followed by death. Hunter (*Trans. and Phys. Soc.*, Bombay, 1860, p. 24) attempted to remove the horn of a bullock, which had been passed into the rectum, by abdominal section. The patient died shortly afterward.

In another case, in which a glass telegraph insulator was introduced into the rectum and passed up into the sigmoid, laparo-enterotomy was performed with a fatal result (*Review Medical Quir.*, Buenos Ayres, 1883, p. 125).

Bryant (*Med. Press and Circ.*, London, 1825, p. 228) reports a case of laparo-enterotomy for a foreign body, after which the patient died.

Gentilhomme removed a foreign body from the rectum by inguinal enterotomy, sutured the intestine, and dropped it back into the abdominal cavity with a successful result.

Trull (*Boston Med. and Surg. Jour.*, 1870, p. 3) operated upon a patient who had introduced a stone into his rectum, which soon perforated the rectal wall and escaped into the abdominal cavity; the foreign body was removed by an abdominal incision, the rent in the intestinal wall through which it had escaped was sewed up, and the patient made a good recovery. (This appears to be the same case reported by Thorndike.) The facts are practically the same in all: either the foreign body has escaped upward into the colon or sigmoid, and, being beyond the reach of the surgeon, it has been necessary to remove it by abdominal section, or the wall of the intestine has been ruptured and the body has escaped into the abdominal cavity. Happily the peritonæum seems wonderfully tolerant of fecal matter for a brief length of time, and if it is promptly wiped out and extravasation and suppurative products prevented from reentering, peritonitis may be very frequently avoided.

One interesting case of spontaneous exit of a foreign body through the abdominal wall is worthy of mention. Vergely (*Jour. de méd. de Bordeaux*, 1884-'85, p. 575) reported the case of a young man who had introduced into his rectum a penholder 19 centimeters long. He suffered no inconvenience in the rectum particularly, and consulted no physician, but finally began to have pain in the abdominal wall at the juncture of the hypochondriac and right inguinal region. After a time

a small, hard object was felt in this region. It soon penetrated the abdominal wall, and proved to be the penholder which had thus spontaneously expelled. Whether it had followed the course of the intestine all around the descending, transverse, and ascending portions of the colon, or whether it had perforated the rectum or sigmoid flexure over toward the right side, and penetrated the abdominal wall through this route, is not definitely known.

CHAPTER XXIII

WOUNDS, INJURIES, AND RUPTURE OF THE RECTUM

Wounds and Injuries.—The anus and rectum, owing to their protected position between the folds of the buttocks and within the bones of the pelvis, are not frequently injured through external agencies. A sufficient number of accidents, however, has occurred to make the subject worthy of consideration. Injuries to these organs may result in contused, lacerated, punctured, or incised wounds. The contusions result chiefly from pressure of the foetal head during prolonged labor, pressure from ill-fitting pessaries, the prolonged retention of foreign bodies in the rectum, too forcible manipulation in stretching the sphincter, falls upon the buttocks, and pressure from pelvic tumors.

Lacerated wounds occur from the introduction of foreign bodies, divulsion of the sphincter, the passage of coproliths or sharp foreign bodies in the stools, such as fish-bones, pins, pieces of metal, etc., the sitting down or falling upon rough, sharp objects. Chamber-pots have broken while the patients were sitting upon them, resulting in laceration and severe hæmorrhage, even in severing the external sphincter, and resulting in partial incontinence. Punctured wounds of the rectum and anus occur chiefly through gunshot and bayonet injuries, but occasionally through other accidents. The records of the late civil war in the United States show that in 103 gunshot injuries of the rectum, 44, or 42.7 per cent, of them resulted fatally. In the Franco-Prussian War there occurred 31 wounds of the rectum, with 15 deaths. In one man the rectum was penetrated by the sharp stump of a weed, over which he squatted down for the purpose of stool; the point entered about 1 inch from the margin of the anus, and penetrated the rectum $\frac{1}{2}$ an inch above the internal sphincter. Such wounds may also occur through accidents in passing a urethral sound; a false passage is made and, owing to the unhealthy condition of the sæptum, the instrument penetrates the rectum.

Numerous cases of perforating wounds of the rectum have been reported through patients falling upon sharp bodies which passed through the anus without injury to it, and punctured the wall of the rectum

higher up. A strange coincidence lies in the fact that nearly all the cases in which the perforating body has passed through the anus without injury at that point and perforated the rectal wall above the internal sphincter, have proved fatal. Among the most frequent sources of this kind of injury is the improper use of syringes and rectal bougies. Nordmann (Kelsey, p. 463) has recorded 25 separate injuries to the rectum due to the improper use of syringe-tips in the administration of enemata; Edwards records a case in which a full quart of soap and water was injected into the perianal tissues in an attempt to administer a clyster. In this case the tissue sloughed, the rectum was practically dissected out from its attachments to the muco-cutaneous border, and retracted upward, thus leaving a large cavity for the accumulation of fecal material.

Injuries from the use of rectal bougies are not so frequent at the present day owing to the fact that stiff instruments are very seldom used for this purpose. Formerly, when the old conical, hard, stiff bougie was used, such wounds were not at all infrequent. Numerous instances have been reported in which the wall was perforated and the instrument passed either into the cellular tissue around the rectum or into the peritoneal cavity, thus causing death. Three instances are known by the author in which the use of the Kelly tube resulted in the perforation of the rectal wall, fecal extravasation, peritonitis, and death.

Instruments penetrating the rectum may occasion more than one wound. Burnier (*Révue méd. de la Suisse Normandie*, 1885, vol. v, p. 171) reports the case of a boy who fell upon a flat bar of iron, which penetrated the anus, perforating the peritonæum at 6 centimeters ($2\frac{3}{4}$ inches), and entered the rectum again at 8 centimeters ($3\frac{1}{8}$ inches) above.

Wounds of the rectum in operations for stone by perineal section have frequently occurred, and they may be inflicted during the operation of prostatectomy. Wounds of the rectum and sigmoid during operations for pelvic tumors or vaginal hysterectomy are not at all rare; it is very easy to catch a fold of the gut in the clamps or angeiotribe, and thus wound it.

Rupture of the Rectum.—Fowler, Nicaise, and Hache have each reported instances in which the rectum has been ruptured by the use of the colpeurynter in suprapubic cystotomy. White and Martin state (*op. cit.*, p. 707) that this accident has occurred so frequently that the large majority of surgeons no longer make use of this apparatus. Dragging upon the organ in efforts to break up attachments between it and pelvic neoplasms have frequently resulted in this injury. The author has reported one case in which the accident occurred through the pas-

sage of an extra-uterine foetus into the rectal cavity. Several cases have occurred during efforts for the reduction of rectal procidentia.

In the chapter upon examinations the fatalities supposed to have resulted from the introduction of the hand into the rectum have been reviewed at some length; while in none of these cases was there any absolute rupture of the entire rectal wall, yet one can not doubt but that this injury may occur from such a procedure where the hand is large and the rectal cavity small and non-distensible.

Prognosis.—The gravity of wounds and injuries to these organs will depend largely upon their site and the tissues and organs involved. Where the injury is confined to the anus and rectal walls, the wounds usually heal under proper antiseptic precautions, and no serious results follow.

Sims (British Med. Jour., February 18, 1882) claims that gunshot wounds of the rectum, although involving the pelvis, bladder, and perinæum, are not very fatal. Out of 7 cases occurring at Sedan, all recovered. The records, however, of our civil war and those of the Franco-Prussian War do not bear out this statement. The statistics in both of these cases record a mortality of over 40 per cent. "Pelvic cellulitis and septicæmia from infiltration, diffuse suppurations, and other consequences, obstructions, lesions, and secondary bleeding were the complications which most frequently preceded a fatal termination in this group of cases" (Medical and Surgical History of the War of the Rebellion, Surg. Vol.).

Where the bladder is involved in the injury and the wound is sufficiently large to admit of fecal extravasation into that organ, the accident should be considered very grave. Fourteen out of 34 such cases resulted fatally.

The seriousness of any injury to the rectum depends, first, upon its height and extent; second, upon the form of the body causing it, its direction, and the force by which it is made to penetrate; and, finally, upon the length of time elapsing between the injury and the observation of the surgeon. The principal factor in all these injuries is the wounding of the peritonæum. Septic peritonitis ordinarily develops within twelve to fourteen hours. It may be possible, therefore, in injuries in which this cavity has been penetrated, to open the abdomen, clean it out thoroughly, close the wound in the gut, and thus prevent the development of septic inflammation. In all such cases there is a certain amount of localized traumatic peritonitis, but this condition is not necessarily fatal. Van Hook has collected 58 cases of injury to the rectum, of which 28 were complicated by wounds of the peritonæum (Monthly Jour. of Med. and Surgery, June, 1896). Of the 26 cases in which there was perforation of the peritonæum, death fol-

lowed in 20, and recovery in 6, cases. In the large majority of these no operation was done until long after the period for the development of septic peritonitis had passed.

In 30 cases in which the peritonæum was not injured, all recovered. The point at which the peritonæum had been penetrated varied from 5 to 25 centimeters (from 2 to 9½ inches). In the case of Lambotte, the foreign body penetrated the wall of the rectum, and afterward entered the sigmoid flexure. Instances of injury to the omentum (Kurella), the jejunum and liver (Poulton), the psoas muscle (Heath), the mesentery and ileum (Watson), the diaphragm and mediastinum (Chattergee), have been reported, and one even in which the puncturing body passed upward to the flexure of the neck (Woodbury). Hæmorrhage from such wounds is usually checked by pressure of the wounding object, if the latter is not withdrawn, or, owing to the lacerated character of the wound, ceases itself before the surgeon reaches the case. There is no record of a case of serious or fatal hæmorrhage from such accidents. Infection of the wound is, of course, likely to occur at all times; this, however, can be prevented, or at least controlled, by free drainage and proper antiseptic treatment. Abscesses, fistulas, and ulcerations may result from such wounds, but they can not be considered as serious results.

Symptoms.—It requires no detailed symptomatology to recognize an injury or wound of the rectum, as the history, the appearance of the parts, the loss of blood, pain, and shock will clearly indicate what has happened. Symptoms which indicate the involvement of other parts, however, especially the peritonæum, are of the greatest importance. In the latter case they are those of immediate traumatism, shock, hæmorrhage, and pain. All of these differ greatly in individuals. In several of the cases reported by Van Hook, in which the peritonæum was penetrated, pain was almost entirely absent. In some the hæmorrhage was exhausting, while in others there seemed to be none at all. Shock is a very variable quantity; some patients completely collapse and become unconscious, while others do not show any symptoms of it. In the case reported by Heath, a boy of eighteen walked over a mile to the doctor's office after a penetrating wound of the rectum involving the peritonæum; he died of peritonitis a few hours afterward. The absence of external evidences of hæmorrhage may be very deceiving. While there may be no blood discharged, the peritonæum and the upper cavity of the rectum may be filled with blood. Tympanites and abdominal pain may occur immediately after the accident or they may be delayed for twenty-four hours, being preceded by a chill, and followed by all the symptoms of septic peritonitis; meteorism will develop, and an anxious expression of the face, vomiting, hiccough, and collapse compose

the final picture in the case. Death is generally quite rapid, occurring within the first seventy-two hours. In two cases reported by Quénu it was delayed until the eighth day, and in one (Neal) it did not occur until the second month.

Quénu and Watson distinguish between the deaths due to peritoneal septicæmia and peritonitis, and claim that the former is more frequently the cause of death than the latter. Watson has shown that a wound may penetrate the mucous wall of the intestine without involving the peritoneal cavity, and yet at the same time peritonitis may follow. Pain in the region of the pubis, dysuria, the presence of urine in the rectum or of blood and fæces in the urine, will indicate the involvement of the bladder in these injuries. Sometimes there is complete retention of the urine, and the patient must be catheterized. In such cases one may find fæcal material and blood in the urine, or he may find no urine in the bladder at all, it having escaped through the bladder into the rectum or into the peritoneal cavity.

Aside from the subjective symptoms, examination of the organ by the finger and instruments will indicate more clearly than anything else the size and extent of the injury. Where the bladder is perforated, one may usually reach the wound with the finger, or see it at least through the proctoscope. We should not be deceived, however, by the fact that there is no leakage of urine or fæces immediately after a puncture or gunshot wound involving the bladder and rectum. The congestion and œdema following an injury of this kind may entirely close the tract of the missile for the time being, but in the course of a few days this reopens through subsidence of the œdema or through sloughing of the tissue around the wound. In gunshot wounds especially there is a traumatism which radiates in all directions and frequently causes gangrene around the tracts some days after the injury; thus, while there may apparently be no communication between the two organs at the first examination, it is altogether possible that a very wide one may develop at a later date. A guarded prognosis is therefore necessary in such cases. Sometimes in perforation of the peritoneal cavity one may also be able to determine the condition with the finger; as a rule, however, such perforations are too high to be so reached. The rectal tube or speculum should always be employed to examine these wounds. By the pneumatic endoscope or the ordinary Kelly tube (with the patient in the knee-chest posture) one may be able in the majority of cases to see the whole field, and sometimes pack the wound so as to avoid further fæcal extravasation; in a case of rupture of the rectum through the passage of an extra-uterine fœtus, it was possible to control the hæmorrhage and pack the foetal sac in this way. In a case of a perforating wound of the bladder the urine could be seen to trickle into the rectum.

The rapid escape of air from the rectum, and inability to inflate this organ after a suspected perforation of the peritonæum, would be indicative that such had taken place, even if the point of injury could not be seen.

Treatment.—The treatment of the rectal wounds and injuries may be summed up in the brief words *drainage* and *disinfection*. Where these are properly carried out little trouble is to be anticipated from minor wounds or injuries confined to the anus and rectum. Hæmorrhage should be controlled according to the surgical principles described in the chapter upon foreign bodies. The rectum, however, should always be thoroughly irrigated with hot antiseptic solution before it is packed, except when the peritoneal cavity is penetrated.

If fistulas, abscesses, or ulceration occur, they should be treated according to the methods heretofore laid down. Perforations of the bladder through rectal wounds often heal spontaneously, and therefore in those cases in which there is no peritoneal involvement early operative interference is not advisable. The bladder may be drained by a soft-rubber catheter and the rectum kept as free from fæcal material as possible by daily cold-water enemata, and if after due time the condition develops into a recto-vesical or recto-urethral fistula, it should be treated after the methods heretofore described.

The treatment of rectal injuries involving the peritonæum is of the greatest importance. Wherever there is any reason to believe that the peritoneal cavity has been opened through a wound in the rectum an exploratory laparotomy should be done at once, and the site, course, and extent of the injuries determined. In doing this one should not waste any time in the removal of the patient, but should operate immediately without any undue movement, so as to disturb the parts as little as possible. If there should be much extravasation of blood and fæcal material into the peritoneal cavity it should be washed out thoroughly with large douches of normal saline solution. If, however, there is only a very slight escape, it is better to wipe the parts off gently with pledgets soaked in mild bichloride solution. It is better to clean out Douglas's *cul-de-sac* by this method than by general irrigation, for by the latter one may distribute throughout the cavity septic germs which were originally confined to the pelvic space. If septic peritonitis has begun, Quénu advises prolonged lavage with artificial serum at 40 degrees centigrade, but normal saline solution is quite as effectual.

Where the wound in the intestine is within reach, it may be sutured and dropped back into the abdominal cavity, or it may be brought up and attached to the edges of the abdominal incision, thus forming an artificial anus. If the wound, however, is low down in the pouch of Douglas, one may find great difficulty in carrying out either of these

methods. A colpeurynter introduced into the rectum will lift the parts up in the pelvis to a certain extent, and bring them within easier reach. One need not mention the advantages of the Trendelenburg posture in performing such operations; the patient should not be thrown into this position, however, until after the pelvic cavity and Douglas's *cul-de-sac* have been thoroughly cleaned out.

Where the opening into the gut can not be closed by sutures, and even in all cases where it has been closed, it is advisable to pass a gauze wick down to the site and bring it out through the lower end of the abdominal wound; it is not safe to close this up without drainage in any case in which there has been a communication between the intestine and peritoneal cavity.

The results of laparotomy in these cases are very encouraging. In 6 cases in which the operation was done, 4 recovered and 2 died, giving a mortality of $33\frac{1}{3}$ per cent. Of 29 cases not operated upon, 5 recovered and 24 died—a mortality of 82 per cent. It is altogether probable that the mortality in the 6 cases would have been still less had the patients been operated upon before the time for the development of septic peritonitis. In the fatal cases, one was done sixteen, and the other more than twenty, hours after the injury.

The treatment of rupture of the rectum should be immediate laparotomy and suture of the wound. If it has occurred during the manipulation of a prolapsed gut, amputation above the point of the rupture may be done, and laparotomy thus be avoided. It is not safe, however, to attempt to close these wounds by suture from the mucous side. In such cases, moreover, laparotomy and dragging upon the gut from above will facilitate the reduction of the prolapse, and in all probability one will be able to close the wound without any escape of faecal material into the peritoneal cavity. Under such circumstances it will be perfectly proper, after having sutured the intestinal wound, to close up the abdominal cavity without drainage.

CHAPTER XXIV

NERVOUS OR HYSTERICAL RECTUM—INSANE RECTUM—NEURALGIA OF THE RECTUM—OBSCURE DISEASES OF THE RECTUM

UNDER one or the other of the above titles a large variety of affections of the rectum have been described. Curling first took up this subject and divided these cases into three classes—the “*irritable rectum*,” “*neuralgia*,” and “*morbid sensibility of the rectum*.”

In the first class he included all those cases in which the rectum is more sensitive to nerve influences, and reacts abnormally to reflex irritations. In the second class he placed all those cases in which neuralgic pains occur about the lower end of the bowel without any discoverable organic lesion in the rectum itself. In the third class he included those cases in which there is a true hyperæsthesia associated with hypertrophy and spasm of the voluntary muscles. He stated that in the majority of such cases a pathological condition exists to account for the symptoms, under which circumstances one can not properly class them under the neuroses.

Hysteria and neuralgia are two very vague terms. They are ordinarily understood by practitioners to mean a condition of the nerves or the nervous system to account for which there is no pathological lesion discoverable. They are both used as mantles to cover up our ignorance in many instances, and when hysterical women and neuralgic rectums are mentioned, it is generally in connection with cases in which there has been a failure to make a diagnosis.

Neuralgias are always the expression of nerve irritation, either mechanical or pathological. Whether that irritation is central or peripheral it is sometimes impossible to state, but it is not likely that any peripheral nerve persistently or periodically produces pain unless there is some excitation of the sensory fibers. That patients sometimes overestimate their pain, and complain more of sensitive areas at different portions of the body than the pains justify, may be conceded; but in these cases there is always a disease of the mind or of the general nervous system which renders the patient incapable of bearing pain. In other words, all pains have a mechanical, chemical, or pathological cause.

The condition ordinarily described as hysteria has of late years obtained much greater respect among physicians. Formerly a woman who fainted or cried without any commensurate provocation was considered hysterical, and little patience was had with her. The large majority of these patients have been found, after making the rounds of different specialists, to have some disease of the ovaries, uterus, or other organs which accounted for their symptoms; in most of the cases termed nervous or hysterical rectum, if one searches long and carefully enough, he will find some local or reflex cause for the symptoms exhibited.

In a discussion of this subject before the American Medical Association in 1888, William Goodell stated that few muscles of the body are exempt from attacks of hysteria, and that the circular ones are the most liable of all to be so attacked. He stated that "in many cases the mind is sane, the organic body is sound, the individual as a whole is above reproach, and yet these muscles will behave as if bereft of reason." In most of the cases so affected, according to this author, one will find symptoms of nervous prostration, backaches, and nervousness, but the chief symptom is referred to the rectum. So intense is this symptom that it masks all the other phenomena, and leads one to believe that he is dealing with some marked pathological lesion of the organ.

In some the symptoms closely resemble those of anal fissure, as there is great pain during or after defecation; in others, the pain is higher up than the sphincter muscles, and there is a periodicity in its character which is probably due to the accumulation of feces in the rectum; and in others still there is a throbbing, pulsating pain that occurs before and during defecation, but disappears after the bowels have been emptied; this may be more intense at one portion of the rectum than at another, as in those cases simulating coccygodynia. Aside from these cases associated with actual pain, there are others described by Goodell in which the sphincter muscle is persistently and powerfully contracted without any cause to account for it.

The movement of the bowels is not associated with any pain, but requires either artificial assistance or an enema before it can be accomplished. In these cases defecation is sometimes followed by great exhaustion, whether the stool is fluid or solid. In other cases the rectum is so sensitive and irritable that the least pressure either from the feces low down within it or the introduction of the syringe will bring on spasm and actual agony.

The least excitement from social, business, or other causes will sometimes bring on either a relaxation of the sphincters and inability to control the movements of the bowels or a spasm of those muscles which unfits the patient for society or affairs.

Mathews practically denies the existence of any such symptoms without a commensurate pathological cause. When Goodell wrote the article referred to, his methods and means of rectal examination were crude and unsatisfactory; nevertheless, they were as good as any other at that time, and it is improbable that he overlooked or failed to observe the gross pathological lesions which are claimed by Mathews to account for all these conditions. At that time these were recognized as well as the reflex influences produced by diseases of the bladder, uterus, ovaries, and other organs, just as they are to-day; but after all these conditions have been accounted for, there still exist a certain number in which it is impossible to find a pathological cause for the irregular behavior of the muscles. The author knows a surgeon, and has examined him carefully and in vain to find any abnormal condition in his rectum, who before he enters the operating-room must invariably retire to the toilet to have a movement of the bowels, notwithstanding he has already had his regular passage for the day.

Goodell quoted an interesting case of a woman whose bowels never gave her any trouble whatever so long as she remained at home and in indoor dress, but as soon as she put on her hat to go out, a painful tenesmus with repeated stools began, and did not cease until she took off her hat and resumed her household duties. Many such eccentric instances can be mentioned, and are only explicable through some abnormal condition of the nervous system.

In those cases in which there is actual pain in or about the rectum associated with or following the stool, it is possible ordinarily to find some pathological change to account for the symptoms. A fissure, whether active or healed, a small ulcer just within the sphincter, a hypertrophied papilla which prolapses and is caught in the grasp of the sphincter, a small polypus, or an inflamed hæmorrhoid, may any of them produce the symptoms described as obscure diseases or hysteria of the rectum.

A small faecal concretion or foreign body lodged in one of the crypts and out of sight may keep up an irritation or neuralgia for an indefinite period; in a case of this kind in the author's experience the patient suffered for from eighteen to twenty-four hours after stool, and yet many examinations by a noted specialist in rectal diseases revealed nothing whatever to account for the symptoms; the rectum and crypts were searched carefully, but nothing was found except a small indurated ridge, apparently the seat of an old fissure which had healed. It was a case in which the nerve-ends had become caught in the cicatrix, and this caused a neuritis. In another case a similar conclusion was about reached when, upon withdrawing the speculum, a minute drop of pus coming from just above the muco-cutaneous margin was observed. At

a second examination a very fine probe was introduced into one of the crypts of Morgagni, and a small burrowing tract extending down about $\frac{1}{2}$ an inch was found. The moment the probe entered into this tract the patient shrieked with pain, and stated that it was the same kind of suffering she had every time she went to stool. The little crypt was slit up and the sphincter muscle incised under the influence of cocaine, and within ten days' time she was entirely well of a condition which had lasted for months.

Many of these cases occur in young women who have not been taught the importance of regularity in the action of their bowels, and consequently they have allowed themselves to become constipated at times, and then, by the use of cathartics and enemas, have brought on drastic movements, forcing large faecal masses through the sphincter and setting up an irritation in the rectal mucous membrane. The pressure of the faecal mass during the periods of constipation produces irritability of the lower end of the rectum, hypertrophy and spasm of the sphincter, and congestion of the blood-vessels of this region. Along with these changes there is an increase in the fibrous elements, and this constricts the nerve-ends, thus producing neuralgias. Allingham believes that this congestion accounts for a large number of the cases of so-called nervous rectum. It is not necessary to describe here the influence of ulcers of the rectum and neoplasms, such as polypi, adenomata, and papilloma, in producing rectal pain, but attention should be directed to a condition described by Ball, Allingham, and Mathews, in which a small congested or irritated spot well above the sphincteric region causes a tenesmus and bearing-down sensation in the organ. The slightest abrasion of the epithelium, the lodgment of small foreign bodies or hard faecal masses in diverticuli of the rectum, or a follicular inflammation, may bring on symptoms which are referred to the anus, owing to the fact that while the afferent nerves supply the upper portion of the rectum and sigmoid flexure very freely, the efferent are largely distributed to the lower end and the voluntary muscles of the organ. Thus the pains may be far removed from the site of causative lesion.

Reflex Irritations.—The intimate association between the rectum and the genito-urinary organs, both in the male and in the female, will account for many reflex symptoms between the two. It is well known to all surgeons how diseases of the rectum, such as fissure, fistula, and ulceration, may simulate uterine or urethral diseases, and how a stricture in the deep urethra may find its most prominent expression in neuralgia and bearing-down pains in the rectum. Prolapsed ovaries, subinvolted uteri, stone in the bladder, inflammations of the seminal vesicles, all frequently cause rectal symptoms when there is no disease of this organ at all. It is quite necessary, therefore, that the rectal surgeon shall be

thoroughly posted in regard to diseases of this kind, and capable of diagnosing any such disorders. Where no organic lesion can be found to account for the symptoms in the rectum a systematic examination of the other organs of the pelvis should always be made.

Nerve Affections.—Frequently, however, nothing will be found in any of these organs to account for the neuralgic pains or irregular symptoms that occur in the rectum. In such cases one must have recourse to the study of the nervous system, especially the spinal cord. Spasm and pain about the rectum are not infrequent symptoms in the beginning of locomotor ataxia; in many of these cases the pains occur in the rectum before they do in the legs and sciatic regions.

Allingham states that in the beginning of mania one often observes the patient has severe pains in the rectum without any pathological condition to account for the same. Reference has been made to the fact that accumulation of feces in the rectum or sigmoid flexure may, by its irritation or the auto-intoxication produced thereby, bring about symptoms of insanity with delusions, which are relieved when the impaction has been removed. One must therefore be careful to distinguish between the cause and effect in such cases.

Rheumatism and Gout.—In the chapter upon pruritus attention was called to the influence of gout or rheumatism in producing rectal symptoms; not infrequently the muscles and perirectal tissues are the seat of gouty or rheumatic inflammations. The writer has quite frequently operated for hæmorrhoids upon patients who suffered with severe aching pain around the anus, expecting the operation and stretching of the sphincter would bring radical relief; but after a few days all the old pains returned. In such patients the administration of large doses of salicylates with alkaline diuretics have invariably given relief, whereas the operation had done no good in this direction. In a number of such cases operation has been deferred until the effect of therapeutics was tested, and it has been gratifying at times to find that the medication entirely relieved the symptoms without a resort to operative interference. The fact that full doses of colchicum sometimes relieves these symptoms lends color to the theory that gout may occasionally cause them.

Insensitive Rectum.—This consists in a decrease of the normal sensibility of the rectum. The patient's bowels will be perfectly regular for weeks at a time, then, after a period of nervous strain or excitement, either from social or business affairs, there will come on a diarrhœa with involuntary passages of feces lasting for several days. The patient will have no warning or sensation of such an impending crisis until the actual escape of the fecal material. Under such circumstances they become hypochondriacal and depressed, unfit for society, and at times

utterly unable to keep themselves clean. In one patient this condition continued for three years; it first developed after a combined operation for hæmorrhoids and appendicitis, the hæmorrhoidal operation having been done one week later than the appendectomy; for a time it was thought it was due to overstretching or to some inflammatory condition around the anus, but prolonged observation and many examinations have failed to find any lesion or lack of sphincteric power to account for the symptoms; sensation in the mucous membrane, however, is below par. Had a Whitehead operation been done in this case, one would have said that the tactile or sensitive area of the rectum had been removed; inasmuch as a simple clamp-and-cautery operation involving only a very small portion of the circumference of the rectum was done, no such explanation can be given. This patient is of a very excitable temperament, suffers greatly from insomnia, and has a small abdominal aneurism. The fæcal passages occur when she is just dropping off to sleep or when she is busily engaged in her social or household duties. It would appear, therefore, that the cause lies in some disturbance of the inhibitory centers governing the sphincter muscles. A similar condition has also been observed in a case of syphilitic disease of the cord.

While, therefore, the large majority of this type of cases may be accounted for by local or reflex diseases, there is still a certain number in which these do not exist. They are due to diseases of the nerves or nerve centers, and this must be recognized in order to avoid operations which will do more harm than good.

Treatment.—The treatment of these conditions will, of course, depend upon their cause. Wherever there is hypertrophy with spasm of the sphincter, together with tenderness and pain, one should not hesitate to follow Mathews's advice and dilate or incise this muscle, and thus put it at rest. At the same time, if there are hypertrophied papillæ or hæmorrhoids, they should be removed. Ulceration should be treated by appropriate measures, such as are indicated in the chapter upon this subject. In those cases in which there is a localized area of inflammation with an abrasion in the mucous membrane, Mathews and Allingham have both obtained excellent results by the application of nitric acid or nitrate of silver to the spot; tincture of iodine serves the same purpose without producing an actual ulceration, such as always follows the application of the severer cauterizing agents.

When the condition is due to a general congestion of the rectum, cold-water irrigation is ordinarily effectual. Better results will be obtained in these cases from the irrigation than from the simple injection of cold water into the rectum. In those cases in which the cold application does not produce as much relief as expected, alternating hot and cold irrigations will often succeed. In order to do this properly, one

should have a Y-shaped tip connecting the irrigator with two bags. The hot water should be run through first at a temperature of 110° to 120°. This should be continued for about ten minutes, when the cold current should be turned on, and this continued for about the same period. By this means excellent results have been obtained in those cases in which there was dull continuous aching, and heaviness about the lower end of the rectum.

Where there is a prolapsed ovary, much benefit may be derived from placing the patient in the knee-chest posture, and placing a tube in the vagina so as to allow this canal to become inflated with air, which will thus carry the ovary upward and lift it out of the *cul-de-sac*, provided there is no adhesion. If in this position the physician can feel the prolapsed organ by means of the finger in the rectum, it will indicate an adhesion, and this should be treated by proper surgical intervention.

Some of these cases are due to retroversion and prolapse of the uterus, often associated with adhesions between this organ and the rectum. Where the uterus can be lifted up and replaced, it may be held in position by a properly adjusted pessary, and the rectal symptoms will immediately disappear. If, however, there are adhesions, these must be broken up and the uterus drawn up into its position by shortening the round ligaments, or by some fixation method.

Where there is a large hypertrophied cervix, with laceration and inflammation, the symptoms are frequently expressed in rectal uneasiness, pain upon movement of the bowels and upon walking, and sometimes intense neuralgia around the lower end of the rectum; often all these symptoms disappear entirely after the amputation of the cervix, or even after a properly performed trachelorrhaphy.

It is a good practice always to dilate the sphincter whenever an operation for lacerated cervix or ruptured perinæum is done. Much of the discomfort following these operations is due to spasm of this muscle. If, therefore, it is well dilated, this source of irritation will be radically removed, and at the same time obscure fissures which may be present will be cured.

The author has reported elsewhere a number of cases of urethral and bladder affections causing rectal symptoms (N. Y. Polyclinic, November, 1894, and *ibid.*, September 15, 1896). Where such conditions are found to exist, they should be treated before resorting to any operations on the rectum. The influence of disease or small foreign bodies in the crypts of Morgagni should not be forgotten in the treatment of these obscure diseases. The writer is well aware that these little pockets have been much maligned by charlatans, who have ascribed to them many disorders of the rectum of which they are not guilty. Nevertheless, they do occasionally become irritated, and when such is the

case they will account for a great deal of pain and rectal uneasiness. In patients who suffer with symptoms such as have been described, the rectum should never be exonerated until a careful search of every one of these little pockets has been made. If in such an examination any one of them is found to be the seat of either inflammation or arrest of a foreign body, it should be slit open, the body removed, and the inflamed condition treated.

Occasionally in these cases one finds a type of stricture which is not ordinarily described in books. It consists in a fine, thread-like band that extends sometimes half-way or more around the rectum, and which is not easily made out by touch unless the rectum is distended more or less. The author has seen this condition four times—thrice in women and once in a man. In two of the cases there was no history of any operation having been performed, nor of any inflammation of the rectum, so far as the patient knew. In one a small tumor had been removed from the posterior wall of the rectum some four years previously, and in the last an operation had been done by the writer five years previously for a submucous fistula. In neither of these cases, however, were the bands confined to the lines of the previous incisions, nor did they obstruct the caliber materially. They appeared when the part was put upon the stretch like a small thread over which the mucous membrane could be moved. Stretching gave some relief, but it was only temporary. In all of them permanent relief was obtained by dissecting out the fibrous cords completely, and suturing the wound together. Microscopic examination showed one of these bands to be of a purely fibrous nature, and not a nerve as was suspected. The treatment of those cases due to diseases of the nerves or central nervous system can not be entered into in a work of this kind. The reader is referred to books on neurology for this.

There still remains a certain number of cases in which no organic disease can be found in the rectum, pelvic organs, spinal cord, or brain to account for the pain. Most of these cases are the victims of anæmia and nervous exhaustion. The treatment of such cases consists in rest, forced feeding, tonics, and change of environment. The so-called "rest cure" of Weir Mitchell will generally give good results.

Nerve sedatives, such as hyoseyamus, asafoetida, bromides, and sumbul, are useful. Excellent results sometimes follow the use of the compound sumbul pill advised by Goodell. At other times the administration of viburnum gives the most relief. Opium is contraindicated in these cases, and, so far as iron is concerned, its tendency to produce constipation overbalances the good which it sometimes serves in the anæmic. Some of the modern preparations which do not so act may be of benefit, but, as a rule, this remedy is detrimental in rectal diseases.

CHAPTER XXV

RECTO-COLONIC ALIMENTATION OR RECTAL FEEDING

RECTAL alimentation is seldom applicable in the treatment of diseases of the rectum, but the teacher in this line is so often consulted with regard to the formulæ and means of carrying out this method of feeding in the various forms of chronic and acute diseases that it seems justifiable to give a short *résumé* of this subject. It is by no means a new method, for nutrient clysters are mentioned in the works of Galen and many of the earlier writers. Not until 1872, however, when Leube first employed pancreatic extract in nutrient enemas, was the method placed upon a scientific basis. From this time forward it was recognized that the colon secreted no digestive ferments, that its function was purely an absorptive one, and that nutrient injections, in order to be of the greatest benefit, must necessarily be predigested and fluid in character.

The more knowledge of stomachic and intestinal diseases, especially of the functional type, that has been gained, the wider and wiser has the application of rectal feeding been. Eichhorst, Huber, Boas, Plantenga, Van Valzah, Einhorn, Ewald, and Nothnagel have paid much attention to this subject, and the following directions are based largely upon their experiments, with the results of personal experience. Whenever it is necessary to give functional rest to the upper portion of the alimentary canal, whether it be the throat, œsophagus, or stomach, the temporary abstinence from food given by the mouth is absolutely necessary. Happily in such cases, a sufficient amount of nourishment may be absorbed through the rectum and colon with which to prolong life for weeks or even months.

M. Tournier (*Province médicale*, 1895, Nos. 29, 30) and Professor Lépine (*Semaine médicale*, 1895, pp. 317, 389) have made interesting experiments in this line. The former fed a patient by this means alone for seventeen days, and observed no wasting, but, on the contrary, an increase of weight. A. P. Gross (*Th.*, Paris, 1898) has collected 66 cases, in which exclusive rectal feeding was carried out in the treat-

ment of patients suffering from various forms of stomachic disease; many of these cases gained in weight while undergoing this treatment; only a very few of them lost at all, and those very slightly. He states that the result as to nourishment seems comparable to that obtained from the milk diet; the diseases in which he found it most useful were ulcers of the stomach, hypersecretion, or excessive sensibility of the gastric mucosa, Reichmann's disease, hyperchlorhydria, stenosis of the pylorus, vomiting of pregnancy, neoplasms of the stomach, and perigastritis. He states that the method should be used exclusively in ulcerations of the stomach, in cases of stenosis of the pylorus, hyperchlorhydria, and hypersecretion, and in cases of dilatation of the stomach with inadequate power from various causes. It is only a complementary method in cases of carcinoma and incoercible neuropathic vomiting. In these a certain amount of predigested food of a bland, non-irritating quality may be administered by the stomach, but the quantity is insufficient to maintain strength, and therefore it should be supplemented by the use of nutrient enemata. At the same time he concludes that in the majority of cases exclusive colonic alimentation is preferable, because the mixed feeding often seems to prevent the absorption of the nutrient enemata. The length of time which such treatment should continue in these stomachic cases is about twenty days.

In surgical operations about the throat, mouth, larynx, stomach, and intestines, this method of feeding is of the utmost importance, and the patient's strength may be very equably maintained if it is properly carried out.

There are two explanations of the methods by which nutrient enemata are absorbed. The first is that the absorptive power of the rectum and colon is adequate to take up the food in sufficient quantities to support life and strength. The other is that these nutrient injections are carried by reverse peristalsis through the Bauhinian valve and into the small intestine, where they are further digested by the pancreatic and biliary secretions, and absorbed by the villi of this region. This latter theory would very easily explain all these cases, but unfortunately this retroperistalsis is the exception rather than the rule. Tournier gives an interesting account of a woman to whom he administered enemata of cod-liver oil in the morning, and who vomited distinct globules of oil during the afternoon. Lépine, Grutzner, and Swiezinsky have all conducted interesting experiments to prove that substances injected in the rectum find their way into the small intestine and stomach in animals. Those upon men, however, are absolutely unsatisfactory. Voit and Bauer recognize the possibility of fluid substances passing from the large intestine through the Bauhinian valve into the stomach; nevertheless, they aver that it is an indisputable fact that the large pro-

portion of the albuminoid material so injected is absorbed in the colon itself. As further evidence of this fact, the author may state from his experience, that in two patients in which right inguinal colotomies were done for carcinoma of the transverse and splenic colon, the patients were nourished for considerable periods of time by the use of nutrient enemata on account of secondary and reflex involvement of the stomach. In these cases it was absolutely impossible for the alimentary substance to pass beyond the artificial anus, and consequently the nutrition obtained was beyond question due to the absorption from the colon itself. The experiments of Grutzner and Nencki have been made upon rabbits, guinea-pigs, and dogs, whose intestinal conformation is different from that of a man, aside from the fact that the erect posture has much to do with the movement of the fluid in the intestinal canal. Their conclusions, therefore, can not be relied upon to explain the subject of nourishment by rectal feeding.

In the chapter upon constipation, the possibility of an occasional passage of fluid from the rectum into the stomach was admitted, but such an action is very far from being the normal course of events. Numerous experiments upon patients with artificial ani convinces one that the large proportion of the fluid material injected in the rectum or colon is either absorbed by that organ or passed out through the anal canal. These experiments seem to do away, then, with the possibility of the digestion of the nutrient enemas after they have been injected into the intestinal canal. It is of the utmost importance, therefore, that the substances used for this purpose should be either pre-digested or ready for direct absorption.

It has been demonstrated by Leube, Huber, and Ewald that proteids are fairly well absorbed by the large intestine. The results of their experiments show: First, milk proteids are not very well absorbed; second, eggs given alone are not well absorbed, but if 20 grains of salt be added to each egg the results will be as satisfactory as if they had been peptonized; third, raw beef-juice is well absorbed; fourth, peptones are well absorbed; fifth, glucose is well absorbed if it is not in concentrated solutions, in which case it irritates the mucous membrane, and is likely to be expelled before absorption takes place, so that Leube advises that it should not be used in stronger than 15-per-cent solution, nor in greater quantity than 300 cubic centimeters; sixth, starch is very well absorbed, even in the raw state, and is not irritating. Fats are not well absorbed, this depending upon the quantity administered, the time that they remain in the bowel, the presence or absence of salt, and the temperature; under the most favorable circumstances not more than 10 grammes of fat can be absorbed in one day; seventh, alcohol in the form of wine, whisky, or brandy, well diluted, is quickly and completely absorbed. From these

experiments it may be concluded that the most satisfactory substances for rectal alimentation are, first, alcohol; second, albuminose or peptones, eggs with salt; third, beef-juice, unboiled starch, and diluted solutions of grape-sugar. Milk, while not freely absorbed in its raw state, when peptonized forms the best basis or menstruum for all enemata. Somatose may be substituted for peptone, as may also Valentine's beef-juice and beef peptonoids.

Red wine has been recommended by a large number of European writers as a satisfactory method of administering alcohol by enemas owing to its astringency as well as its acidity, thus contributing to their retention in the intestine. Fresh blood has been advocated by a number of writers, especially by Ricketts, of Cincinnati, who uses from 5 to 10 ounces daily of defibrinated beef blood, which must be obtained fresh every morning. He reports having kept a patient alive for six weeks upon this treatment, and having finally obtained a very satisfactory result. Andrew Smith (Bull. of Academy of Med., New York, 1879, p. 123), as chairman of a committee appointed to investigate this subject, reported a number of observations in which enemata of defibrinated beef blood had been used in different pathological conditions; many of these were tubercular, others carcinomatous, and others in advanced stages of chronic disease; the results in the majority of instances were exceedingly good; in a few cases, however, the patients not only did not improve, but were rendered worse by the treatment. This form of rectal alimentation does not seem to have established any great superiority over the other forms, and at the same time it is very inconvenient, and often impossible to obtain.

Recently French therapeutists have obtained some very excellent results by the use of organo-serum for nutrient enemata, especially in cases of nervous exhaustion and inability to retain food from one cause or another; this substance possesses excellent tonic effects, and in cases where it is impossible to administer sufficient nourishment by the mouth, one may supplement this by injections of organo-serum, with permanent and decided benefit.

In deciding upon rectal alimentation, one should always consider what elements are most necessary in the individual case. In acute exhaustion from hæmorrhage, overwork, or nausea, where stimulation and filling of the blood-vessels are indicated rather than actual nourishment, one should have recourse to enemas of hot normal saline solution, with small quantities of red wine, whisky, or coffee. In shock and collapse, whether from surgical operations, injuries, or other causes, great benefit may be obtained from an injection of 1 pint of hot black coffee.

Where the case is one of chronic disease, in which the enema is not

intended for temporary purposes but as a means of permanent feeding, the stimulating portion of the enema should be left out, inasmuch as it is likely to irritate the mucous membrane of the intestine and render it intolerant of the injection. A good formula for rectal feeding is a mixture of 3 eggs, $\frac{1}{2}$ a teaspoonful of salt, 6 ounces of peptonized milk, with or without a tablespoonful of beef-juice or beef peptonoids, 1 tablespoonful of good rye whisky.

Gross recommends the formulas of Ewald and Boas in the majority of cases.

Ewald's formula is: Two to 3 eggs, 1 glass of red wine, 1 cup of 20-per-cent solution of grape-sugar, 2 or 3 grains of salt.

Boas's formula is as follows:

Milk	250 c.c.;
Yolk of egg	2;
Salt	1 pinch;
Red wine	15 c.c.

A little starch may be added to this.

The methods of administering nutrient enemata vary considerably. It is important in all cases that the bowels should be cleaned out at least once in twenty-four hours when rectal alimentation is being carried on, and this is best accomplished by large saline enemas, which act more effectually if administered cold, though Ewald, Tournier, and Gross prefer to use them hot. The cold, however, acts more promptly, and the bowel seems to be more tolerant of the nutrient enema after them than after the hot ones. The amount of the nutrient enemas can not be laid down by any hard-and-fast rule; some patients will retain 6, 8, and 10 ounces, while others can not retain more than 3 or 4 ounces. Where the patient will retain as much as 8 ounces at one time, the enema should be administered not oftener than four times in twenty-four hours. When, however, only 3 ounces can be retained, they should be administered more frequently. Occasionally it will be necessary to add a little opium to the enema in order to quiet the sensibility of the mucous membrane of the intestine. The quantity necessary, however, is generally quite small, 4 to 5 drops of laudanum being ordinarily sufficient. This use of opium becomes more necessary after the process has been carried on for some days, and it may be necessary to increase the quantity from day to day.

As to how long rectal alimentation may be continued can not be stated. Hutchinson claims that it is impossible to develop more than 500 calories of energy daily by this means, whereas at least 1,500 are required by patients to maintain the equilibrium of health. The experiences of Tournier, Gross, Ewald, and others do not bear him out in this

statement. A patient has been kept alive by this method twenty-six days, so that an extensive gastric ulcer has been cured because of the functional rest to the stomach; she lost flesh, but was no more emaciated than one often finds after attacks of typhoid or other acute diseases. In the last five or six days of her treatment she was able to take about 2 ounces of peptonized milk daily by the stomach.

In another instance of gastropptosis with ulceration and severe hæmorrhages, the patient was fed by nutrient enemata for eighteen days exclusively. When the treatment was begun the patient was practically pulseless, emaciated, and collapsed, following a severe hæmorrhage. At the end of eighteen days his pulse was full and round, 70 beats per minute, his respiration normal, his body had filled out, and he was able to walk several blocks. He finally resumed taking food in the normal manner and lived one year comparatively comfortably, when suddenly the old condition redeveloped with, at the same time, an abnormal irritability of the rectum, which rendered the organ intolerant of the nutrient enemata, and it could not be made so, even by the use of opiates in large quantities. The patient being unable to take nourishment, either normally or artificially, succumbed. As a rule, however, one may say that twenty days will probably cover the average period in which exclusive rectal alimentation may be carried out.

The method of administering these clysters is as follows: The patient is laid in the Sims's position, with the hips elevated upon one or two pillows. A No. 5 Wales bougie is then introduced into the rectum, and whatever gas is contained in this organ is allowed to escape through its opening. The bougie should be introduced to the distance of $3\frac{1}{2}$ inches, or just high enough to be entirely above the sphincteric contraction.

Some writers advise injecting the nutrient fluid into the sigmoid flexure; but this method is much more likely to excite peristaltic action and ejection, of the fluid than if it is poured into the ampulla of the rectum and allowed to find its way upward.

The fluid should also be injected very slowly; if given from a fountain syringe, the bag should not be raised more than 2 feet above the level of the patient's hips. The small soft tube is important in order to avoid injury to the parts about the anus, and also because it does not stretch the parts and produce a tenderness which might militate against prolonged treatment by this method. The fluid should be heated to 100° Fahrenheit. Cold or very hot solutions always excite peristaltic action, and are not suitable for this method of treatment.

The following formulæ, given by the most noted writers upon this subject, may be of interest to our readers, as many of them differ from those heretofore given, and may be applicable to special cases:

Riegl's formula:

Milk	250 c.c.;
Eggs	2 to 3;
Salt	2 to 3 pinches;
Red wine	30 grammes.

Catillou's formula:

Beef peptone (saturated solution)	50 grammes;
Water	125 grammes;
Bicarbonate of soda	30 centigr.;
Laudanum	4 drops.

Tournier:

Salted bouillon	140 to 150 grammes;
Yolk of egg	2;
Wine	20 to 40 grammes;
Sydenham's laudanum	4 to 8 drops.

Tournier:

Milk	140 grammes;
Yolk of egg	2;
Sugar	10 grammes;
Laudanum	4 to 8 drops.

Tournier:

Bouillon	140 grammes;
Yolk of egg	6;
Wine	20 grammes;
Salt	2 teaspoonfuls.

Tournier:

Water	150 grammes;
Dry peptone	10 grammes;
Yolk of egg	1;
Glucose	20 grammes;
Sydenham's laudanum	4 drops.

Professor Jaccoud's formula:

Bouillon	250 grammes;
Wine	150 grammes;
Yolk of egg	2;
Dry peptone	4 to 20 grammes.

Lathier employs:

Dry peptone	3 teaspoonfuls;
Yolk of egg	1;
Milk	125 grammes;
Tincture of opium	5 drops;
Starch-powder	5 grammes.

Adamkiewicz recommends:

Dry peptone	100 grammes;
Flour	300 grammes;
Oil	90 grammes;
Salt	30 grammes;
Bouillon	1,000 grammes.

In several injections.**Fleiner:**

Bouillon	200 grammes;
White wine	50 grammes.

Singer uses:

Milk	125 grammes;
Wine	125 grammes;
Yolk of egg	1;
Salt	2 grammes;
Witt's dry peptone	1 teaspoonful;
Glucose	2 grammes.

Schlesinger employs:

Milk	200 grammes;
Eggs	2;
Wine	15 grammes;
Rice flour	6 grammes;
Salt	2 pinches.

Ratjen uses:

Milk	250 grammes;
Yolk of egg	2;
Salt	1 pinch;
Red wine	15 grammes;
Starch	15 grammes.



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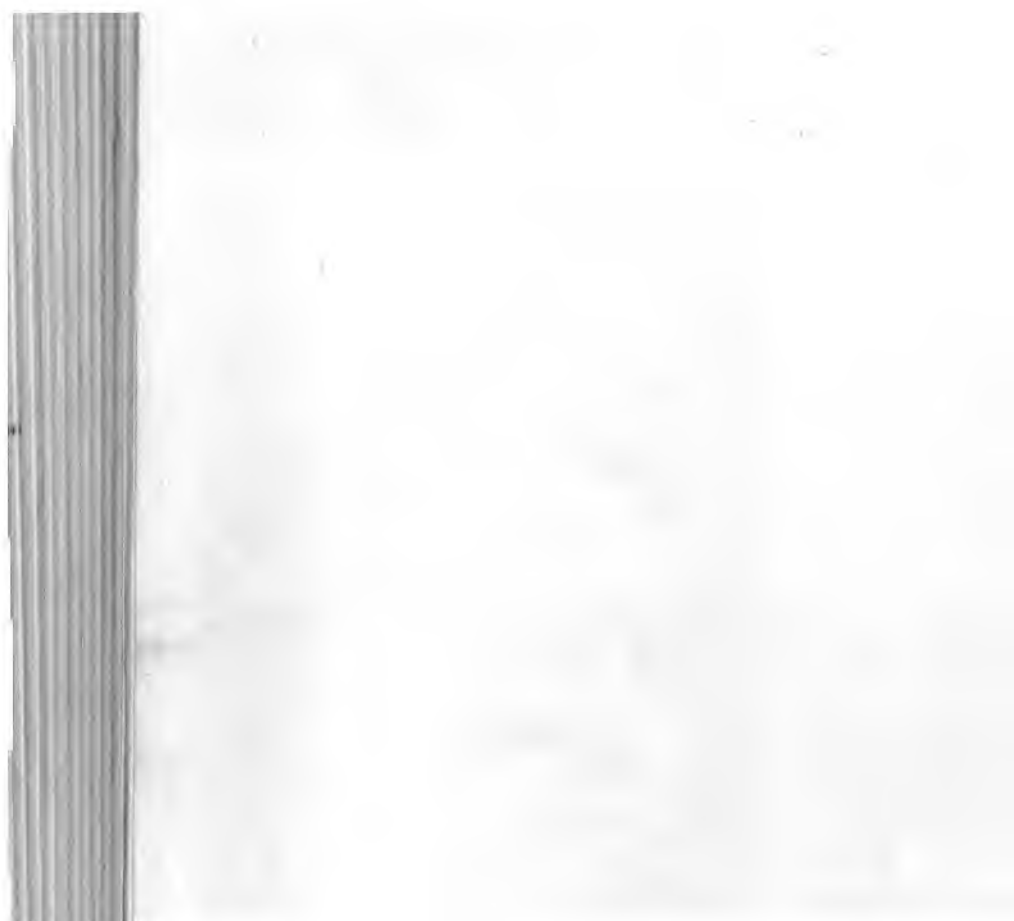
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